Using Reusable Learning Objects (RLOs) to Share International Experiences: Faculty Perceptions and Best Practices in a College of Agriculture[1]

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Abstract

Educators across colleges of agriculture continue to strive to improve the educational experience for students. The use of reusable learning objects (RLOs) is one method that is being pursued. For the purpose of this study, an RLO was defined as a short (i.e., 5-15 minutes), media-based instructional package that included a learning objective, content, media (pictures, videos, and/or audio) and an assessment. This study was grounded by Kolb's theory of experiential learning in the collection of preflection and reflection responses from participants and the area of instructional design in regard to the development of reusable learning objects. The purpose was to investigate faculty perceptions of RLOs and by doing so, document challenges to creating RLOs and determine best practices for development and use in order to internationalize agricultural curriculum. Qualitative research consisting of face-to-face, semi-structured pre- and post-interviews was employed. Respondents reported positive perceptions of RLOs both prior to and after their engagement in the development process. This study revealed recommendations for practice that can encourage the development and use of reusable learning objects within colleges of agriculture.

Introduction

Educators across colleges of agriculture continue to strive to improve the educational experience for students. The sharing of international experiences by faculty with students is one example of how education can be improved. The use of reusable learning objects is one method among others, such as students' oral verbalization (Pate and Miller, 2011), inquiry-based instruction (Thoron et al., 2011), experiential learning (Wulff-Risner and Stewart, 1997), "popular culture media" such as music and movies (Bruce and Ewing, 2009, p. 8) and virtual simulation (Rhoades et al., 2009), that is being pursued to improve education. RLOs are commonly defined and identified in a variety of ways. The IEEE (Institute of Electrical and Electronics Engineers, Inc.) broadly defined a learning object as anything that could be used for education (2002). A more specific definition stated that learning objects are *"generally understood to be digital and multimedia-based, which can be reused and – in some cases – combined with other learning objects to form larger pieces of instruction"* (Farha, 2009, p. 2). Each learning object should be specific to one topic (Boyle, 2003). Some authors have indicated that RLOs are small, only large enough to include, at the most, a few related ideas (Conlan et al., 2002; Polsani, 2003). One author indicated that length can vary (Downes, 2001) based on how many ideas were covered and how complex each idea was, however they should be independent of other related content (Boyle, 2003).

Researchers have articulated that an RLO is an object that can come in all shapes and forms (Downes, 2001; Farha, 2009; Muzio et al., 2002; Polsani, 2003). Therefore, there is some ambiguity involved when defining an RLO because of the vast differences in characteristics (Polsani, 2003; Sicilia and Lytras, 2002). For the purpose of this study, an RLO was defined as a short (i.e., 5-15 minutes), media-based instructional package that included a learning objective, content, media (pictures, videos, and/or audio) and an assessment.

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Benefits of Reusable Learning Objects

Being proficient in information and communication technology is incredibly important for students enrolled in a college of agriculture, both in class and after graduation (Cox et al., 2011). Internet use in colleges of agriculture has greatly benefited both instructors and students by facilitating communication between the two groups, allowing access to a greater range of resources for supplementing lectures and helping make the use of new technologies possible. However, colleges and faculty should keep in mind that Internet resources should be carefully examined for quality (Molnar and Fields, 2004; Rhoades et al., 2008). According to results from a Student Assessment of Learning Gains survey, students who were taught with an online lesson rather than in a traditional setting were more satisfied than the traditional group, showing that incorporating online elements into introductory soil science classes can effectively "enhance student interest, motivation and satisfaction" (Mamo et al., 2004, p. 51).

The possible benefits of using RLOs in the classroom are diverse and could have far-reaching impacts for faculty. A 2009 study by Farha found that test scores for students using learning objects were "nearly three times higher" (p. 8) than for traditional students who used texts. In addition, usage can decrease time and costs for faculty, as they have the ability to create lessons from units of already-developed material rather than assemble a lesson from scratch (Brusilovsky, 2004; Downes, 2001; Sicilia and Lytras, 2002). Using RLOs, especially within the context of online learning, helps students learn in a "spiraling, progressive manner" (p. 315) which is a mode of learning that comes naturally to the brain and promotes deep learning (Hamid, 2002). Students who used audio podcasts to gain knowledge about history and design of English gardens and horticulture scored the same as non-users on written exams and performed better than nonusers on oral exams that required students to gain a deeper, more interlinked understanding of the material (Siciliano et al., 2011). Using technology in courses benefits students by giving them experience with technology that they can apply to future situations. Additionally, technology can be used very successfully to teach agribusiness components such as marketing, finance and management to agribusiness students (Schurle et al., 2004).

While educators have historically been required to do at least some re-authoring of material in order to mold it to the needs of their current students, RLOs allow educators to easily reuse material by breaking it up into small chunks. Because the lessons based on RLOs could be "personalized to a learner's cognitive preferences," the RLOs can result in "more effective learning" (Conlan et al., 2002, p. 1). *"[RLOs'] most significant promise is to increase and improve the effectiveness of learning and human performance"* (Hodgins, 2002, p. 76). According to this author, the major benefit of RLOs is the "ability to capture knowledge" (p. 79) so that it can be reused and eventually be improved with new information. The power of reusable learning objects is realized "when just-right information is flowing to the right place, person and time" (p. 79).

Drawbacks with Using Reusable Learning Objects

Given the benefits that exist, one might wonder why RLO use for agriculture and other fields has not been adopted on a more wide-scale basis. Sharing RLOs can be difficult due to their individual nature. Thus, what is a primary benefit becomes a drawback. As shared by Duval (2001), it can be extremely difficult to share metadata between users due to the use of many unique systems for managing metadata. This ultimately means that potential users of RLOs may find locating usable RLOs difficult, thus, there is a need to make finding them easier. Given that RLOs can be created on different programs and stored in different ways, the reuse of an RLO created by another individual is made difficult (Brusilovsky, 2004). Duval (2001) stated the importance of uniformity and consistency in the field of education and training.

The basic step of defining RLOs can also create dilemmas that affect overall creation and use. Muzio et al. (2002) shared drawbacks that could be associated with the use of RLOs that included size (i.e., How much information should it cover?) and the issue of "intellectual property" (p. 24). Related to this is the question of what is the best way to compile or classify RLOs (Churchill, 2007; Downes, 2001; Hodgins, 2002; Lukasiak, et al., 2005). Developers have concerns that their RLO will be used without citation and wonder whether or not they should be freely shared (Downes, 2001; Muzio et al., 2002). Finally, the ideal length of a learning object is a subject that has been contested for years (Churchill, 2007; Conlan et al., 2002; Muzio et al., 2002; Sicilia and Lytras, 2002).

Hamid (2002) listed three elements, "information architecture," "user interface design" and "content strategy" (p. 313) as aspects that users and designers should be aware of when creating online learning content. Lack of awareness and understanding of these three areas could create drawbacks. Only limited research has been conducted about faculty perceptions of RLOs.

The purpose of this study was to investigate agricultural faculty perceptions of RLOs in order to better understand the creation process and use of RLOs

to internationalize the undergraduate curricula. A specific goal of the study was to document the following: 1) perspectives of the definition of an RLO, 2) challenges of creating and using RLOs, 3) benefits of creating and using RLOs, 4) best practices for development and 5) best practices for use.

Context of the Study

This study was part of a USDA Higher Education Challenge Grant that was awarded to faculty at the University of Florida, Texas A&M University and the University of Georgia. One goal of the grant was to utilize the development of RLOs by agricultural faculty to internationalize agricultural undergraduate curricula. An examination of participating faculty's perceptions of RLOs and the RLO development process both before and after their participation in an international experience and engagement in the RLO development process allowed a deeper understanding of how faculty see RLO use and application. This insight allowed the documentation of best practices that can benefit others seeking to utilize RLOs as part of their instructional process.

International experiences assist individuals in preparation for interdisciplinary work, according to a literature review conducted by Vincenti (2001), because they practice putting their material into different cultural formats during their time abroad. This study sought to determine agricultural faculty perceptions and reactions to RLO development in the context of using content collected in an international setting.

The need for instruction to be increasingly efficient and effective across the field of agriculture is critical. This study sought to add to the body of knowledge related to teaching and learning by focusing on the use of reusable learning objects to internationalize agricultural curriculum.

Conceptual Framework

The overarching framework for this study was based upon instructional design and the need for functional units of instruction. As stated by Love (1964), "successful teachers know that a unit of instruction must center on the needs of the student" (p.20). Students have become more technologically savvy and thus, there is a need for instructors to alter their perspectives of what instruction can be. There are a variety of ways in which instruction can be improved. Using technology that adds "animation, video and sound" to instruction provides students with a more interactive model that simplifies difficult concepts (Boyd and Murphrey, 2002, p.37). Gagne (1985) outlined nine steps that have guided the creation of quality instruction. These concepts include gaining attention, providing objectives, encouraging recall, the presentation of material, providing guidance and feedback while also encouraging/assessing performance and enhancing retention. While it is true that reusable learning objects do not necessarily address all of the steps explicitly, these steps provide a good guide for the creation of quality content that can meet the needs of today's students.

Methods

Phenomenological research (Merriam, 2009) was used for this study. The methodological framework utilized Kolb's theory of experiential learning in the collection of preflection and reflection responses from participants. The study was deemed exempt by the Texas A&M University Institutional Review Board.

Kolb's theory of experiential learning (Kolb, 1984) and, as an extension of Kolb's model, the addition of preflection (Jones and Bjelland, 2004) provided a mechanism to collect rich data from participants. Kolb outlined four stages of learning: abstract conceptualization, active experimentation, concrete experience and reflective observation. As individuals are guided through each of these stages, an awareness and understanding of the topic at hand is gained. Jones and Bjelland (2004) introduced the idea of preflection. Preflection is a means by which participants are made aware of the expectations of the experience to be had. This activity promotes participants' learning during the first three stages of Kolb's theory of experiential learning model and, in turn, promotes a higher level of information processing during the reflection observation stage.

Participants were purposefully selected. According to Merriam (2009), criterion-based selections, or purposive samples, are selected based on identified, desirable characteristics. The participants were chosen based on their participation in the Trinidad and Tobago Faculty Abroad experience. There were a total of eight faculty members who participated in the international experience and thus were selected for participation. Participants were described as including both male and female faculty members with extensive teaching experience and adequate use of technology.

Each participant was engaged in a face-to-face, semi-structured pre- and post-interview process (Merriam, 2009). The protocol contained open-ended questions about the objectives of RLOs and the creation process. The exact wording and order of the items were not predetermined; rather, they served as guiding questions for the researchers to explore identified topics and issues. Examples of questions included: What is your personal definition of an RLO?; How difficult do you feel creating on RLO will be?; How do you expect to incorporate the RLOs you create into your classes?; and,

What impact do you think your RLOs could have on your undergraduate curricula? Time was allowed for the participants to communicate any additional information and/or comments to the researchers. The same protocol was used for both the pre- and post-interviews. However, it was reworded for the post-interview to encourage reflection on the experience and allow the researchers to identify any changes or impacts of the experience on the participants. The participants were coded (using the designations R2 through R9 to identify participant responses) to ensure confidentiality.

Each interview, both pre- and post-, lasted approximately 30-40 minutes. The interviews were held in a location chosen by the participant so they would feel comfortable. Two researchers were present at each interview and took field notes to record the participant's responses. After the interviews were completed, the researchers compared and compiled field notes in a debriefing session to ensure the understanding and accuracy of the recorded responses; the data were then compiled into one document. Follow-up interviews were conducted as needed to further understand the best practices associated with RLO development and use. Participants were contacted by telephone, email, or in-person for the follow-up interviews.

The establishment of trustworthiness (Lincoln and Guba, 1985) is critical within qualitative research and is dependent on ensuring credibility, transferability, dependability and confirmability. Credibility was established through persistent observation, referential adequacy and peer debriefing by the researchers (Erlandson et al., 1993). Purposive sampling and the use of participant quotes enabled transferability, while the use of a reflexive journal and audit trail ensured dependability and confirmability (Erlandson et al., 1993). In addition to the in-depth, pre- and post- interviews, one of the researchers accompanied the faculty participants during the international experience and recorded field notes in regard to the RLO development process, thus allowing persistent observation.

The data were analyzed using the constant comparative method as described by Glaser and Strauss (1967) in which each comment or statement is compared against one another to determine categories and themes. This method of qualitative data analysis is comprised of four stages: (a) comparing incidents applicable to each category, (b) integrating categories and their properties, (c) delimiting the theory and (d) writing theory (Glaser and Strauss, 1967). The researchers unitized the data and categorized them into emergent themes. The themes were identified as perceived definitions of RLOs, challenges of RLO creation, benefits of RLO use and best practices.

Results and Discussion

Perspectives of the Definition of a Reusable Learning Object

During preflection, faculty participants articulated that a RLO is *"information that would accomplish one learning objective. It may consist of printed material, web, audio, video, various opportunities to engage the student in that learning objective" (R8). RLOs package "content, case studies, and assessments"* (R4) to address a topic. The responses are not surprising given that project planners had informed participants of RLO components during the initial faculty participant recruitment process. Participants also indicated that RLOs were easily transferable and usable by interested parties. Although only one of the faculty members had created RLOs in the past, the other seven faculty members indicated that they had created what they felt to be similar learning objects for their classes (e.g., case studies, annotated presentations, etc.).

In analyzing the reflection interview data, the experience affected the faculty's understanding of the RLO creation process and content requirements. Faculty gained an increased awareness of the student's perspective. *"The experience changed my idea of a RLO; it made more important the need to provide as rich a context as possible"* (R6). *"[A RLO] should be contextually rich. It takes students virtually to a place and gives them a vicarious experience"* (R8). Faculty participants also expanded their view/understanding of the content requirements. *"The PowerPoint is just the beginning. You have to write the assessment, write the key of the assessment, provide enough information [for those that want to use your RLO]"* (R3). "The expectations are to include more videos/interviews than I thought" (R4); RLO users need to be able "to put their own context to it to make it applicable to larger systems" (R8).

It can be concluded that for this group of faculty the idea of creating a small, reusable learning piece was not a new phenomenon, but rather the reintroduction of a process with a new name. During their reflection, faculty indicated that RLOs would be easily transferable and usable by others. However, as shared by Duval (2001), the sharing of material can be difficult. In fact, the literature clearly stated that the success of RLO use will depend on "standardization" (Duval, 2001) of RLO development. It is possible that the way in which the program was organized and administrated influenced the perception of the participants and caused them to feel that the RLOs developed as part of the program would be easily shared as a result of support from program staff.

Challenges of Creating and Using Reusable Learning Objects

During preflection, participants indicated that the RLO creation process would not be difficult, but it would be most challenged by lack of time to work on the materials. "[RLO creation] will not be difficult, especially in terms of innovative ideas; the time constraint will be difficult" (R7). The lack of a set template was also a challenge for faculty. "It will not be hard after I identify a form" (R4). "I suspect there will be a lot of agonizing over the first one; then you get a work flow pattern established" (R3). Faculty indicated that the work may be made more efficient by collaborating with another faculty member through teamwork (R8, R9).

During post-reflection, the faculty spoke about the challenge to RLO creators to provide ample and vivid context for both the teachers and students that may review the content (R3, R6, R8). *"The difficult part is creating the context. I feel the responsibility to create the context to make it hit home [with the students]"* (R6). In addition to providing acceptable context, challenges also included issues related to time and layout. Challenges expanded to include filtering through and gaining access to all of the media that was collected. *"The video I want, another faculty member has it; also, I don't have access to all the pictures and video right now"* (R8). Writing the script for the narration was also seen as a challenge (R2). Contrary to the faculty's initial preflection to collaborate, not one RLO was created as a team effort.

A need exists for increased support to be provided in terms of training and technical support. The use of video was specifically identified as an area where assistance was needed. Further, engagement in the RLO development process caused faculty to be more individual in their approach rather than working as teams and a need exists to encourage teamwork and collaboration through project activities.

Benefits of Creating and Using Reusable Learning Objects

During preflection, when asked about the potential impact of the RLOs on their curricula, faculty agreed that RLOs would not only extend the students' understanding of the content, but would also provide the students with a broader perspective of the content (R2-R9). RLOs will allow students to "see how others do what we do in a different context" (R5) and "get students to think about broader, more varied context" (R6). Participants reported that RLOs would allow students to see an international setting and possibly correct their misconceptions of different cultures. *"There are misconceptions of different cultures; [students] see them as third world and tribal versus having cities, etc."* (R7).

During post-reflection, the faculty expanded on the impact that the international experience and RLO development could have on their curricula. Faculty indicated that the RLOs would be welcomed by the students as a new teaching method. *"Students will value that it is something that I experienced and created, not just a video I found"* (R2). Faculty also responded that the RLOs would be much easier to present because they were a genuine experience. *"I feel more comfortable presenting the information to students because it is a genuine experience; it will feel more real to the students"* (R5). Respondent R8 indicated that RLOs are a new teaching method that could be incorporated into a teaching methods curriculum. Respondents also reported hope that the RLOs would increase the students' awareness of opportunities abroad (R2, R4, R6, R7, R9). *"I hope, if we do a good job, it would elicit more of a study abroad interest for our students" (R6)* and an *"increased awareness of opportunities abroad, such as study, research, and careers"* (R9). The use of RLOs focused on sharing specific international experiences can not only provide students with an increased awareness of international opportunities, but will allow students to make global connections. *"[RLOs] will provide students a different perception of how policies can impact the U.S. and how they impact other countries"* (R7). As an extension, the faculty expressed hope that their RLOs can be used by other faculty in their own disciplines and in other disciplines to make both global and cross-discipline linkages. *"I see opportunities for the strengthening of relations between disciplines, such as agriculture, health and urban planning"* (R6).

Best Practices for Development of International Experience RLOs

Faculty provided reflections on best practices for RLO development. Faculty members made suggestions that affect every aspect of RLO creation, starting with the planning process. It was shared that the excitement and opportunities in the destination country can become overwhelming. Faculty suggested that RLO creators have a clear idea of the topic(s) that they want to address. *"The trip provides you with so many valuable opportunities, ideas, and contacts that you get overwhelmed in the process"* (R7); *"...losing focus becomes easy. Having a concrete topic beforehand helps you to remain centered on the information you are looking for to assist you in creating a high quality RLO"* (R9).

Every faculty member (R2-R9) indicated in the preflection that teamwork may be a beneficial component to RLO creation; in the end, not one RLO was created as a team effort. In reflecting on the best practices of teamwork in RLO creation, faculty had varied opinions.

"*I work well by myself, but teamwork is always good to stimulate each other. I guess I would favor it, but small teams… not more than two people per team"* (R2). *"I think utilization of teams would have been a good idea. This framework would have made participants accountable to other team members"* (R7).

There were also mixed opinions about the type of media inclusion that should be used in RLOs. "I think video is more important because it includes audio and pictures" (R9); "I think [short videos] would be more effective [for student learning]" (R2). *"I'm really glad I did the video segments, but I must admit, I spent an inordinate amount of time planning them, and they didn't add as much as I thought they would"* (R3). "Video with audio is best—but also most difficult. Audio over pictures is probably most realistic" (R8).

The most resounding best practice was to work on and try to complete the RLOs while still in the destination country. "Stick to the goal of having the RLO done BEFORE departing the country" (R3), "the problem is that once you got back to the U.S., other issues take precedence over the RLO" (R7). "I really do think the reflective work time in country is important" (R3).

Another suggestion was the use of a trip theme for the RLO topics to address. *"Everyone would be writing toward the same learning outcomes…taking a team approach to developing a very targeted, comprehensive learning module; everyone contributes in the areas of their expertise"* (R3). "This would allow for more utilization beyond case study focus" (R7).

Best Practices for Using Reusable Learning Objects

Reflection indicated that RLOs may be best used as lesson enhancers versus primary lesson topics. One faculty member shared, *"The most effective use of an RLO is to enhance a current topic in a course…reflect on the information in the course and use the RLO to improve global understanding of the issue"* (R9). *"RLOs can be used best as interest approaches, as advanced organizers, as realistic problems. [They are] less valuable to teach specific content"* (R8).

Recommendations and Implications

This study revealed recommendations for practice that can assist the profession in encouraging the development and use of reusable learning objects. A clear definition and description of how RLOs will be used must be provided to participants involved in the process. Technical support should be provided that allows the faculty to focus on the content to be shared in each RLO. In addition, the use of metadata will be important as the RLOs are promoted for use by other faculty. While participants reflected that the RLOs they developed would be useful to others, it is not known to what extent RLOs have been utilized. Further, professional development in regard to effective development strategies and the use of media is critical.

The focus of this study was limited to the perceptions of agricultural faculty involved in the development and use of RLOs related to an international experience. Additional quantitative research is needed that focuses on the adoption and use of the RLOs developed as part of this project. The engagement of a larger sample would allow for the testing of relationships between variables and more accurately measure the effectiveness of the use of RLOs. Questions still remain regarding the use of RLOs. For example, how many students were impacted as a result of the RLOs developed? How have the faculty involved selected to use the RLOs developed? How many faculty, outside of those who participated in the creation of the RLOs, have used the RLOs for instructional purposes? Addressing these questions can generate further data to support or dispute the use of RLOs in colleges of agriculture.

Summary

Reusable learning objects (RLOs) offer tremendous potential in regard to extending the reach of educators across colleges of agriculture to serve students in an efficient manner. However, it is recognized that challenges exist in regard to development and delivery. RLOs must be developed in a way that provides value to both instructors and ultimately to the students. The findings from this study revealed that faculty gained a stronger understanding of RLOs and their value through engagement in the process. Findings also revealed that while faculty may see value in the creation of RLOs to internationalize curricula, they recognize that the creation of RLOs can be time consuming and require technical skills for quality development. In addition, engagement in the process appeared to have changed the participants' perception of the type of content that should be used and the way that context should be used in the creation of RLOs. Although faculty reported during preflection that collaboration and teamwork would be beneficial, results of post-reflection revealed that they did not engage in these activities in the actual development of their own RLOs. Post-reflections also revealed that faculty viewed the RLO development process as a means to bridge disciplines.

Literature Cited

Boyd, B.L. and T.P. Murphrey. 2002. Evaluation of a computer-based, asynchronous activity on student learning of leadership concepts. Jour. of Agr. Education 43(1): 36-45.

Boyle, T. 2003. Design principles for authoring design principle for authoring dynamic, reusable learning objects. Australasian Jour. of Educational Technology 19(1): 46.

Bruce, J.A. and J.C. Ewing. 2009. Popular culture media as a teaching tool in agricultural and extension education. NACTA Jour. 53(4): 8-11.

Brusilovsky, P. 2004. KnowledgeTree: A distributed architecture for adaptive and intelligent learning management systems. In: Proc. 13th International World Wide Web Conference. New York, NY: 17-22 May.

Churchill, D. 2007. Towards a useful classification of learning objects. Educational Technology Research and Development 55(5): 479-497.

Conlan, O., D. Dagger and V. Wade. 2002. Towards a standards-based approach to e-learning personalization using reusable learning objects. In: Proc. 7th World Conference on E-learning in Corporate, Government, Healthcare, and Higher Education. Montreal, Canada. 15-19 Oct.

Cox, C., L. Edgar, K. Munise and D. Johnson. 2011. Use of required information and communication technology tasks in undergraduate agriculture courses. NACTA Jour. 55(2): 2-7.

Downes, S. 2001. Learning objects: Resources for distance education worldwide. International Rev. of Research in Open and Distance Learning 2(1). http://www.irrodl.org/index.php/irrodl/issue/view/11. (Sept. 22, 2011).

Duval, E. 2001. Standardized metadata for education: A status report. In: Proc. of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2001. Tampere, Finland. 25-30 Jun.

Erlandson, D.A., E.L. Harris, B.L. Skipper and S.D. Allen. 1993. Doing naturalistic inquiry: A guide to methods. Newbury Park, CA: Sage.

Farha, N.W. 2009. An exploratory study into the efficacy of learning objects. The Jour. of Educators Online 6(2). http://www.thejeo.com/Archives/Volume6Number2/FarhaPaper.pdf. (Mar. 10, 2010).

Gagne, R. 1985. The conditions of learning (4th ed.). New York, NY: Holt, Reinhart and Winston.

Glaser, B. and A. Strauss. 1967. The discovery of grounded theory. Chicago, IL: Aldine.

Hamid, A.A. 2002. e-Learning: Is it the "e" or the learning that matters? Internet and Higher Education 4: 311-316.

Hodgins, W.H. 2002. The future of learning objects. In: Proc. of 2002 eTEE Conference: e-Technologies in Engineering Education - Learning Outcomes Providing Future Possibilities. Davos, Switzerland. 11-16 Aug.

IEEE. 2002. Draft standard for learning object metadata. New York: The Institute of Electrical and Electronics Engineers, Inc.

Jones, L. and D. Bjelland. 2004. International experiential learning in agriculture. In: Proc. 20th Annu. Conference, Association for International Agr. and Extension Education. Dublin, Ireland. 23-29 May.

Kolb, D.A. 1984. Experiential learning. Englewood Cliffs, NJ: Prentice-Hall.

Lincoln, Y. and E. Guba. 1985. Naturalistic inquiry. Newbury Park, CA: Sage.

Love, G.M. 1964. Needed – more functional units of instruction. Jour. of Agr. Education 5(2): 18-21.

Lukasiak, J., S. Agostinho, S. Bennett, B. Harper, L. Lockyer and B. Powley. 2005. Learning objects and learning designs: An integrated system for reusable, adaptive and shareable learning content. ALT-J: Research in Learning Technology 13(2): 151-169.

Mamo, M., T. Kettler, D. Husmann and D. McCallister. 2004. Assessment of an on-line erosion lesson as a teaching tool in introductory soil science. NACTA Jour. 48(3): 47-52.

Merriam, S. 2009. Qualitative research: A guide to design and implementation. San Francisco, CA: Jossey-Bass.

Molnar, J.J. and D. Fields. 2004. Using the Internet for instruction: Experiences, possibilities, and considerations. NACTA Jour. 48(4): 12-19.

Muzio, J.A., T. Heins and R. Mundell. 2002. Experiences with reusable e-learning objects: From theory to practice. Internet and Higher Education 5(1): 21-34.

Pate, M.L. and G. Miller. 2011. A descriptive interpretive analysis of students' oral verbalization during the use of think-aloud pair problem solving while troubleshooting. Jour. of Agr. Education 52(1): 107-119.

Polsani, P.R. 2003. Use and abuse of reusable learning objects. Jour. of Digital Information 3(4).

Rhoades, E., C. Friedel and T. Irani. 2008. Classroom 2.0: Student's feelings on new technology in the classroom. NACTA Jour. 52(4): 32-38.

Rhoades, E.B., T. Irani, M.B. Tingor, S.B. Wilson, C. Kubota, G. Giacomelli and M.J. McMahon. 2009. A case study of horticultural education in a virtual world: A web-based multimedia approach. NACTA Jour. 53(4): 42-48.

Schurle, B., J. Stroade and O. Grunewald. 2004. Using computer-generated modules to integrate computer applications through a curriculum. NACTA Jour. 48(3): 25-29.

Sicilia, M.M. and M.D. Lytras. 2002. Scenario-oriented reusable learning object characterizations. International Jour. of Knowledge and Learning 1(4): 332-341.

Siciliano, P.C., M.A. Jenks, M.N. Dana and B.A. Talbert. 2011. The impact of audio technology on undergraduate instruction in a study abroad course on English gardens. NACTA Jour. 55(2): 46-53.

Thoron, A.C., B.E. Myers and K. Abrams. 2011. Inquiry-based instruction: How is it utilized, accepted, and assessed in schools with national agriscience teacher ambassadors? Jour. of Agr. Education 52(1): 96-106.

Vincenti, V.B. 2001. Exploration of the relationship between international experiences and the interdisciplinary work of university faculty. Jour. of Studies in International Education 5(1): 42-63.

Wulff-Risner, L. and B. Stewart. 1997. Using experiential learning to teach evaluation skills. Jour. of Agr. Education 38(3): 43-50.