

Learners' Use of Learning Objects

*Mohamed Ally, Martha Cleveland-Innes,
Natasha Boskic, and Sandra Larwill*

Abstract

This article reports findings from a study exploring the generativity (Gibbons, Nelson, & Richards, 2000; Parrish, 2004) and discoverability (Friesen, 2001) of learning objects in the hands of the learner. Through the convergence of two separate pilot projects—the Canadian EduSource initiative through Athabasca University, and the researchers' ongoing study of affective learning in online learning environments (Cleveland-Innes & Ally, 2004)—learner perspectives of learning object use and value was evaluated. Participants in the study of affective outcomes in the workplace worked independently with learning objects and outlined the interaction with learning object repositories and individual learning objects. Analysis of learners' activity and response indicates that selection of learning object repositories and objects is based on personal needs and expectations for satisfying desired learning outcomes. Data analysis found pedagogical and contextual implications of learning object technology from the point of view of the learner. Results suggest that there is opportunity to combine learning object technology with consideration for learner engagement in designs that support lifelong learning principles and focus on learner development rather than the content or the technology.

Résumé

Cet article nous fait part des résultats d'une étude explorant la générativité (Gibbons, Nelson, & Richards, 2000; Parrish, 2004) et la facilité à trouver (Friesen, 2001) des objets d'apprentissage entre les mains des apprenants. Grâce à la convergence de deux projets pilotes distincts—l'initiative EduSource de l'Université Athabasca, et l'étude en cours des auteurs de l'apprentissage affectif dans des environnements d'apprentissage en ligne (Cleveland-Innes & Ally, 2004)—la perspective des apprenants à propos de l'utilisation et de la valeur des objets d'apprentissage a été évaluée. Les participants à l'étude sur les conséquences affectives en milieu de travail ont utilisé des objets d'apprentissage de manière indépendante et ont souligné l'interaction entre les dépôts d'objets et les objets d'apprentissage individuels. L'analyse de l'activité et de la réponse des apprenants indique que le choix des dépôts d'objets d'apprentissage et des objets eux-mêmes est basé sur les besoins personnels et les attentes de l'apprenant sur les capacités des objets à satisfaire les besoins d'apprentissage. L'analyse des données a permis d'identifier des conséquences pédagogiques et contextuelles de la technologie derrière les objets d'ap-

prentissage, du point de vue de l'apprenant. Les résultats suggèrent qu'il y a une opportunité de combiner la technologie soutenant les objets d'apprentissage et une préoccupation pour l'engagement de l'apprenant grâce à des designs qui soutiennent les principes de l'apprentissage à vie et se centrent sur le développement de l'apprenant plutôt que sur le contenu de la technologie.

Introduction

Consideration of pedagogical use of learning objects follows closely on significant efforts to identify and metatag information items that could be applied in learning settings (Wiley, 2001). Many possibilities exist for human growth and development through learning objects, which gives rise to questions about the role of the learner in learning object development, storage, and application. Supporting active, self-directed, and continual learning for individuals using learning objects will add significant value to the outcomes of learning object use.

The opportunity to evaluate individual use of learning objects emerged in the convergence of two separate projects: the Canadian EduSource initiative through Athabasca University and our ongoing study of affective learning in online learning environments (Cleveland-Innes & Ally, 2004). A team of researchers at Athabasca University worked to create a network of accessible, interoperable learning object repositories (Cleveland-Innes et al., 2005). According to Ally (2004), learning objects must be designed with the learner in focus and be tagged for easy retrieval if they are to add value to the learning process. To test this premise, the retrieval and application of learning objects was evaluated by learners engaged in a study of affective learning outcomes in the workplace.

As part of this study, participants in a customer-service course in the workplace worked independently with learning objects and outlined their process in applying the object to the course objectives. Three general research questions guided the collection of these experiences: (a) For what reason(s) do learners choose learning objects? (b) How do learners respond to and use learning objects? (c) What is the likelihood that learners will access further learning objects after initial engagement with objects/repository?

Literature Review

Learning objects offer a new level of functionality and efficiency to instructional design and delivery through technologically mediated learning environments. Learning objects offer instructional designers the opportunity to create instructional elements (content segments, process instructions, and affective exercises) in small parts that are reusable, scalable, and adaptable in multiple and varied learning contexts (Wiley, 2001). A critical design objective of learning objects is that the learner can generate per-

sonalized meaning, apply the information in a real-life setting, and achieve desired learning outcomes. In addition, learning outcomes should be enhanced when learning objects are tied to the learning outcomes and incorporated into the instructional design process overall (Ally, 2004). Recent evidence supports improved outcomes in the form of retention and pass rates when learning objects are integrated into higher education curricula (Bradley & Boyle, 2004).

The generative character of learning objects is the focus of this research (Gibbons, Nelson, & Richards, 2000; Parrish, 2004). Generativity refers to the object's ability to present itself dynamically at the time of use. Reusability rests on generativity: the flexible, adaptable application of learning objects, which provides opportunity to accommodate varying learners' readability levels, language levels, and learning styles. An object that has high generativity will probably be more adaptable because alternate objects needed by learners in varied contexts can be changed more easily.

At the same time as learning objects become more valuable through increased flexibility and dynamism, learners can increase their independent learning skills by using learning objects for their own purposes. This opportunity is reflected in the call for change in education to support lifelong learning.

The needs of an information- and technology-based global economy, the complexities of modern life, the accelerated pace of change and the growing demands for competent, high-skill performance in the workplace require that we produce much higher numbers of individuals—whether high school, community college or four-year graduates—prepared to learn their way through life. (Wingspread Group on Higher Education, 1993)

The development of continual learning occurs when learners become cognizant, or explicitly aware, of their learning processes and the direct management of these processes. Learning object repositories appropriately designed for varying delivery and accessibility modes (e.g., downloadable for offline use, transferable to other electronic media for convenient access, learners able to find the appropriate learning object with ease) can provide this new level of learning engagement. This presumes that both repositories and the learning objects themselves engage learners as active agents (Evans, 2004), with opportunity to reflect on and manage their own learning. Just as patrons browse a library's collection of books, someone looking for information, new knowledge, and solutions to problems should be able to browse and access learning objects, contextualize the information for personal meaning, and apply their new knowledge in real life (Ally, 2004).

This enhancement of learning objects to foster meta-learning for individuals who use them is readily available in multimedia-rich materials (Laurillard, Stratfold, Luckin, Plowman, & Taylor, 2000). The opportunity for self-directed search, retrieval, use, and reuse of learning objects can be enhanced by embedding explicit direction in relation to learning within and around the repositories and objects. Learning objects will go beyond content dissemination wherever the learning process itself is made explicit through learning object use.

It is the process of learning, not the technology, that enables and constrains what can and will be done with learning objects (Collis & Strijker, 2004). Simultaneous to the development of learning objects is the reinvention of the role of learner. Learning objects, then, must embody instructional elements to foster understanding, facilitate the opportunity for self-reflection, and support individual use of each object. Thus maximum access and benefit of learning objects will be realized.

Method

How, then, would learning objects have to be created and tagged to maximize self-directed use for individual learners? To begin to answer this question, we collected learners' accounts of their use of learning objects. Learners were asked to work independently with learning objects and outline their process of application of the object to the course objectives. Three questions guided data collection and analysis: (a) For what reason(s) do learners choose learning objects? (b) How do learners respond to and use learning objects? (c) What is the likelihood that learners will return to use learning objects and/or repositories again to sustain learning?

Participants

Participants in the course entitled Meeting Customer Needs in Online Service Environments were employees at call centers and help desks in organizations. Findings from Human Resource and Skill Development Canada (HRSDC) confirmed that these employees must not only be able to handle the technological aspects of their job, but also respond appropriately to a variety of customers' queries using good soft skills (MacLeod, 2000). Further training on soft skills was recommended for help desk employees. However, traditional classroom-based workshops were not convenient and efficient for all organizations. Two sections of an online course were offered, one in fall 2003 and the second in winter 2004. Forty-three people participated in the fall section and 57 in the winter section. Participants had similar background experiences with technology because they worked as technology support personnel, but the online learning experience was new to all of them.

Content

Content that had been developed by one of us for classroom use was adapted for an online environment and modularized to promote flexibility in learning and just-in-time training. The course addressed the following topics:

- Reviewing Customer-Service Agent Relationships;
- Customer Service in Online Environments;
- Relationship Building in Online Environments;
- Customer Service in the Call Process.

Research Instruments

Survey of fixed-choice learning objects. Participants from both sections in both pilots of this course were invited to participate in research on soft-skill development and learner use of learning objects. Over the duration of the course, they were directed to supplementary learning material in the form of learning objects housed in the Digital Reading Room (DRR) at Athabasca University. The learning object description included title, media type, and overview of content. Participants were asked to choose material they thought would interest them in relation to the course material and objectives.

A pop-up survey with seven questions on reasons for choosing the learning object appeared when participants clicked on a learning object. In order to proceed to the learning object, they had to fill out and submit the survey. Similarly, a pop-up questionnaire with three questions about the extent to which expectations were met appeared when the interaction with the learning object was completed. A total of 120 interactions between a learner and a chosen learning object were catalogued during this phase of the research process. Frequency results from each survey are summarized and reported below.

Survey of free-choice learning objects. Additional data were collected in the second pilot study. Learners were directed to other online repositories that housed material appropriate to a customer-service course. Participants were required to go to at least one of three repositories and identify material of value in the development of a professional practice model for customer service. They then completed an assessment of the value of the repository and the object(s) chosen, one assessment for each object.

The following questions structured the assessment:

1. Describe which Learning Object Repository you went to and what you observed.
2. How useful was the repository for your purposes?

3. Which learning objects did you choose?
4. What did you do with the learning object? (e.g., read, copy, print, save, discuss, etc.)
5. What did you gain from the learning object?
6. Would you go back to this repository to look for learning objects?
Why or why not?

This assessment was made by participants in each of two sections of a continuing education course on customer service in the second pilot run of the course. Assessment forms were posted to the courses sites or e-mailed to instructors. The assessment was not part of the course evaluation process and was voluntary.

Data analysis for the study was conducted by two research assistants, who were not directly involved in the delivery of the course. Qualitative data analysis of the open-ended survey assessments was undertaken by the two research assistants who used a process of open coding to identify three themes: ease of use in terms of Web site navigation, relevance of content to users' needs, and learning activities that elicited transfer of knowledge. These categories were further refined with a second coding using an inductive approach to analyze the data more openly from the learners' perspective and experience. Coding proceeded with a constant comparison method. Interrater reliability was calculated at 94%. Subsequently, the findings were combined and are reported in relation to the study's three research questions.

Findings

Data collected and summarized from two pilot studies are reported here. We collected quantitative data from pre- and post-surveys about learning objects in the Athabasca University DRR. Results identify learners' reasons for choice and reactions to the learning objects that had been chosen by instructional design to be housed in the DRR. In the second pilot study, we had participants also examine learning objects from open-access repositories. Through qualitative data analysis, we identified the search process and value placed on repositories and individual learning objects. Findings from each pilot are presented separately under each of the three research questions.

Use of Learning Objects from the DRR

The purpose of the pre- and post-surveys of learning objects from the DRR was to identify why these learners chose particular learning objects and how they responded to them. Participants were asked to go to the DRR, fill out a pre-survey, use the learning object, and then provide an assessment of how it met their expectations. To access a learning object, the participants had to fill in a pre-survey. In all, 34 participants (13 in pilot 1 and

21 in pilot 2) filled in pre-surveys. They ranged from those who reviewed only one learning object to one participant who examined more than 10 objects. In total, 115 pre-surveys were completed. Their mean responses are provided in Table 1.

Learners' Search and Selection of Learning Objects

As is evident from Table 1, participants accessed the learning objects because they were asked to do so. They expected the objects to increase their knowledge and skill level, and the title and description of the object influenced their choice of object only a small amount. Responses from participants were not uniform across learning objects, suggesting individual attention was paid to each object and responses were made based on their experience with the individual objects.

Learners' Response and Use of Learning Objects

Only 24 participants chose to fill in the post-surveys. In pilot 2, the 14 participants completed 39 surveys for 13 of the 18 learning objects in the inventory. The results are shown in Table 2. The means for Pilot 2 participants were higher than those in Pilot 1, but overall the sense is that they found the objects only somewhat beneficial to their learning.

Table 1
Pre-Survey Results

	<i>Pilot 1</i>	<i>Pilot 2</i>
1. I chose this learning object because of the type of object, e.g., a Web site, a document, an audio clip, etc.	2.2	2.3
2. I chose this learning object because of the title.	2.9	2.9
3. I chose this learning object because of the author.	0.9	1
4. I chose this learning object because of the description.	2.6	2.6
5. I chose this learning object for reasons other than the above. Please specify:	-	-
6. I chose this learning object because I expect to increase my knowledge on the topic indicated.	3.3	3.3
7. I chose this learning object because I expect to increase my skill level in the area indicated.	3.1	3.2
Total number of participants	13	21
Total number of surveys	42	73
Number of learning objects evaluated	12	17

Responses scaled 1-4: (1) Not at all; (2) Only a small amount; (3) To some extent; (4) Definitely yes.

Table 2
Post-Survey Results

	<i>Pilot 1</i>	<i>Pilot 2</i>
1. I learned what I expected to learn from this learning object.	2.5	2.85
2. I found this resource beneficial to my learning.	2.4	2.7
3. This learning object was beneficial to this course.	2.5	2.9
Total number of participants	10	14
Total number of surveys	31	39
Number of learning objects evaluated	10	13

Likelihood of Return to Use Learning Objects Again

Data collected from participants' use of learning objects in the DRR provide evidence that learners did engage with more than one learning object. Most participants went beyond the minimal expectation and looked at a number of learning objects. This suggests an interest in either the process or the outcome of working with the learning object. Seven (20%) of the 34 participants evaluated only one learning object. However, 62% evaluated two to five objects, and 18% evaluated six to 10 learning objects. Most were willing without requirement to examine a number of the learning objects offered.

Open Learning Object Repository Evaluation

The purpose of the open learning object repository evaluation was: (a) to explore learners' motivations for searching through a repository and selecting learning objects, and (b) to identify learners' perceptions of a quality repository.

Participants were invited to select and evaluate learning objects from at least one of three learning object repositories for customer-service-related learning objects. In all, 16 participants completed this task. Two chose to review Edusplash, three chose CanLOM Knowledge Agora, and 11 investigated the Wisconsin Online Resource Center.

Learners' Search and Selection of Learning Objects

Meeting learning objectives. Learners chose a repository of objects based on how well the repository appeared to meet their immediate learning needs. Participants' responses varied from not meeting their purposes at all to providing the learner with a better understanding of relationships and encounters with their customers. For a few participants, external requirements were cited as the main reason, as identified in the following participants' responses.

As I was doing this at work between calls (shhh!) and had limited time, I browsed through only the first page, which left me with three potentially viable results

Because I was told that it will help me learn.

Others gave responses that indicated more internal personal motivators, for example, to explore and search for knowledge that would help them in their current or future workplace.

Learners' Response and Use of Learning Objects

New knowledge. Participants demonstrated acquisition of new knowledge through evaluation of the selected repositories, as evident in the following participants' comments.

I learned a new tool to use with the customer/clients I speak with.

I learned some of the differences between "interactions" and "encounters" with customers, how they are different and some of the reasons why.

A new perspective of looking at others inside our own organization as being internal customers.

Participants acknowledged the realization of differences between relationships and encounters, new perspectives, insights, application to job context, and value for service quality and positive customer relationships.

Knowledge transfer to memory: Making connections. Participants' responses indicated evidence of enriching their existing knowledge base and reinforcing current job tasks regarding customer service concepts. For example, respondents commented:

Our services do not come cheap so we should be giving our best for our customers regardless of any difficulties.

The most interesting part of this learning object was the fact that I recognized most of the slang, and that I use some of it at work on work orders.

Reminders of how important the relationship is with the customer in every detail of what we do as CSRs everyday.

Learning activity/action—Active, passive. Overall, participants were passive in their learning activity action. Twelve participants read through the repository and/or learning object(s). One of the 12 participants read and printed the learning object for further use. Three participants engaged in active learning activity through discussions with colleagues, four com-

pleted quizzes and exercises, and at least one applied the information to tasks at work.

Likelihood of Return to Use Learning Objects and/or Repositories Again

Information. Extensive information is not of value if the content is not relevant to the learner; some participant feedback indicates that an object should be transparent in content, with specific information that is easy to understand (lay terms), with hands-on examples and exercises, and is user-friendly. For example,

I found that it was easy to follow and quite informative and user-friendly.

There are a lot of great resources for teachers, and I personally think a ton of great resources for ESL teachers ... perhaps one day I would return for the ESL purposes.

Most participants expressed willingness to return to the repositories and explore more on their own if time and circumstances permitted. Some participants also indicated that the repositories served as a reference point to further discuss customer service topics with colleagues and serve as an ongoing job aid in helping learners to transform their everyday tasks, working relationships, and attitudes with customers as expressed by one participant, "Yes I would, because it made me think about things I do every day, and as I have said above, how would I change my attitude."

Discussion

Analysis of learner activity and response indicates that selection of learning objects and learning object repositories is based on learners' personal needs and expectations for satisfying learning outcomes desired. The data support the argument that learning object tags and intrinsic motivation are important driving forces in the selection, use, and reuse of learning object repositories and objects. To some extent, learners used the title of the learning objects to decide whether to view and learn from a learning object. This may be similar to the title of a book or article; this is the first decision point when deciding to read it or not. Careful attention to the relationship between title and the learning potential of the object may result in more satisfactory searches for appropriate learning objects.

The type of learning object (print, audio, video, etc.) was not an important criterion for deciding whether to select and work with learning objects. Learners were more interested in the content than the format.

Participants engaged in free choice of any learning objects that they felt related to their work. This suggests the value of practical, application-focused information as a characteristic of learning objects. In order to develop learning objects that are learner-centered, self-directing, and pro-

vide active, continual learning, the following design criteria are recommended: (a) have clearly identified learning objectives for the specific learning objects and represent these in the title; (b) take into consideration learners' engagement; and (c) design active learning activities that elicit transfer of knowledge, knowledge construction, and the likelihood of reusability.

Conclusion

The integration of existing research, data analysis and interpretation suggest the following general conclusions. Learners require search information that is easy to understand. Their engagement is the keystone of any teaching-learning transaction; learning objects should provide active learning through hands-on activities and examples. As with all adult learning, learning objects should be relevant to applications that support work-related or personal goals. Accessibility and learner engagement in an object are important to learning. Identifying learning objectives in the search mechanisms of the objects so that learners can easily see the relevance of content to their needs will facilitate satisfaction with the search process and the use of the object. This supports knowledge transfer and the potential for reuse when knowledge transfer is incomplete.

These characteristics of the learning object search and the capacity for engagement influence the following outcomes. Learners are more likely to return to the repository and the object where these features exist and more likely to assign value to the repository and the object. These features will affect the extent to which the learner contextualizes and applies information. There is potential for the generation of new knowledge under these conditions.

Participants accessed the learning objects because they were asked to do so. However, most participants looked at a number of learning objects, not just one. This suggests an interest in either the process or the outcome of working with the learning object.

Much research on learning objects has focused on tagging and designing learning objects (Hamel & Ryan-Jones, 2002; Krauss & Ally, 2005; Metros, 2005; Petrinjak & Graham, 2005; Quinn, 2000). This research bridged the gap in the research by looking at learners' experience with learning objects and their behavior when accessing them. Results from this study have many implications for educators who design and tag learning objects.

Learning objects must be designed with the learner in focus so that learners can access the objects easily and benefit from them. In course development, learning objects must be tied to course learning outcomes so that the learning experience relates back to the course (Ally, 2004). Also,

learning objects must be designed for access as required and for immediate application. As indicated in this study, learners select learning objects that are related to the courses they are taking and to their current job.

Learning objects must be tagged properly to facilitate ease of access by learners and to provide learners with enough information to decide whether to work through a learning object. For the learners in this study, the title of the learning object was one criterion for deciding whether to retrieve and complete it. The title must reflect the content of the learning object and must be inviting.

The learner's motivation level must be taken into consideration when developing learning objects. Perhaps various types of learning objects should be developed for varying motivation levels. For example, learners who are not motivated in a subject area could be prescribed a learning object to help them connect to the course content. This could motivate them to access other learning objects that are related to a course.

This study's findings are limited to the group that participated in the study: customer service agents in a call center environment. This group has highly developed computer skills, and people in this occupation are accustomed to working independently with customers. Given the higher number of participants who completed pre- rather than post-surveys, results may have been biased by the requirement to complete surveys—participants could neither reach the learning object nor close their browser without responding to the survey. This may have resulted in rushed, careless responses. Voluntary participation in the learning object assessment means the most interested and motivated were engaged; the general population might have found the repositories less engaging.

Research on learners' use of learning objects is currently limited. This study advanced current research and points toward more research needed in the following areas.

1. How much do learners transfer from the experience with the learning objects to practical, on the job situations?
2. Do learners with varying learning styles access varied learning objects, and what are their experiences with the learning objects?
3. How can learning objects be embedded with intelligence to adapt to learners needs?

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Mohamed Ally is an associate professor in the Centre for Distance Education at Athabasca University. He has published in many journals, written chapters in books, and presented papers at national and international conferences. His current research interests are in the

use of mobile technology in distance education, learning in the workplace, and providing support to distance learners. He can be reached at mohameda@athabascau.ca.

Martha Cleveland-Innes is an associate professor in the Center for Distance Education at Athabasca University and teaches in the Master of Distance Education Program. She has received several awards for her work on the student experience in online environments and holds a major research grant through the Canadian Social Sciences and Humanities Research Council. Current research interests are in the area of leadership in distance education, disciplinary differences in online higher education, and emotional presence in online communities of inquiry. She can be reached at martic@athabascau.ca.

Natasha Boskic is an educational technology manager in the office of External Programs and Learning Technologies (EPLT) in the Faculty of Education at the University of British Columbia (UBC), Vancouver. Her main work is in instructional design and faculty training in online learning. Her specific focus is on online collaborative and communication tools, student engagement, and various delivery models. Natasha has managed various projects in the area of e-learning in Canada and internationally. She received her undergraduate degree in English language and literacy in the University of Novi Sad, Yugoslavia (now Serbia), and her Master's in Distance Education from Athabasca University. She can be reached at natasha.boskic@ubc.ca.

Sandra Larwill is an academic manager with Algonquin College, School of Part-Time Studies, Ottawa. She oversees the development and management of the school's Distance Education and Health Studies programs. Sandra is currently a graduate student of the Master's in Distance Education (MDE) program, Athabasca University. Research interests include the enrichment of learning through education technology, distance education program management, and adult education fostering educational and social reform. She can be reached at slarwill@magma.ca.