

Assessing Undergraduate Needs Within Online Learning Management Systems in Colleges of Agriculture

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Abstract

The internet has served as the basis for online learning for the past 30 years. Learning management systems have become a primary focus of public and private universities as the next generation of college students expect open and unfettered access to their education. The purpose of this Delphi Study was to investigate the instructional needs of undergraduate agriculture students enrolled in online learning environments at a midwestern College of Agriculture. Two research questions guided this investigation, (1) what are the essential components for an effective undergraduate online learning management system and (2) what are stakeholder perceptions of learning management system design, development, coursework, and design themes? Using the Delphi Model for consensus an undergraduate panel (N = 10) was convened to identify the vital components for learning management systems which addressed instructional design, application of course content, and student collaboration education within online learning platforms. Undergraduate panelists indicated the need for faculty to have professional development opportunities to improve their design and implementation of online learning and an expert in LMS design and course delivery to answer questions and aid in the course development process. Undergraduates at Colleges of Agricultural Science should be provided extended or foundational training in major aspects of online course enrollment including course use and access, communication functions to enhance student and faculty collaboration, more robust formative assessment opportunities for online learning, lesson adjustment, and improved multimedia in the course assignments.

Keywords: agriculture, distance-based education, learning management system, perceptions of online programs, student learning, undergraduate education

Introduction

The United States is at a remarkable moment in the history of higher education in online-based learning (Larreamendy-Joerns & Leinhardt, 2006). Valentine (2002) noted that the history of distance education has existed for more than 100 years. As reported by Volery and Lord (2000) distance education was originally intended to cater to disadvantaged students existing in areas where proximity to higher learning institutions was limited. To counter the debilitating effects of education deserts (Myers, 2018) online learning has the promise to serve the 11.2 million adults without access to on campus learning. Roberts and Dyer (2005) reported that teaching and learning and the delivery of content in an online learning environment can take many forms and utilize many learning activities. Keegan (1995) defined distance education saying “distance education and training result from the technological separation of teacher and learner which frees the student from the necessity of traveling to a fixed place, at a fixed time, to meet a fixed person, in order to be trained” (p. 7). Chumbley et al. (2018) reported that for students to advance and achieve their goals, they must be successful in various educational learning environments. Harasim (2000) indicated the development of online course delivery made education increasingly accessible allowing new instructional models to emerge. Alqurashi (2018) supported the importance of accessibility while meeting the increasing

number of student enrolling for distance education opportunities.

Learning management systems have become a primary focus of public and private universities as the next generation of college students expect open and unfettered access to their education. Chumbley et al. (2018) reported the past 20 years have witnessed dramatic changes in student learning opportunities and Larreamendy-Joerns and Leinhardt (2006) addressed the importance of higher education in regards to online-based learning. The inconsistencies of web-based learning modules and appropriate preparation of content design have demonstrated a misapplication of best practices for teaching and learning in online forums. Two barriers are commonly inherent to online education. Student interest and course development of online learning modules present specific challenges. As technology becomes smaller, affordable, and more accessible online education platforms are natural pathways for current and future students to access instructional opportunities. Strong et al. (2013) reported that the increasing use of mobile platforms for instruction is changing the traditional style of learning while creating new and innovative teaching and delivery methods. The role of teaching and learning in agriculture-based classrooms and the delivery of content in online learning environments can take many forms and utilize varied learning activities (Roberts & Dyer, 2005). Course delivery (Allen & Seaman, 2004) has evolved to meet the trend of university campuses offering courses online or utilizing a blended approach. Allen and Seaman (2013) also support online course delivery and noted a 400% increase in online learning courses in the past decade. The availability of learning management systems as a course delivery platform combined with interest in lifelong learning has created a significant incentive for universities to develop online programs (Volery & Lord, 2000). Online education is invaluable for students regardless of location, cultural, personal economics, or politics on a global scale. Rumble (2001) reported that from 1971-2001 distance education had changed tremendously due to five factors: technology, pedagogical shifts from transmission towards a constructivist model, the growing acceptance of distance education, perception, and the focus on the student as a consumer of learning. These factors highlight the need for the distance education learning management systems while recognizing the changing role of the student as both equal parts consumer and creator of content.

Learning management systems have established the availability of economical platforms to access educational content. The emphasis for academic preparation has only recently shifted from preparing all students for post-secondary education to a focus on college and career readiness (Barnes et al. 2010). This evolution of practice has focused the design and implementation of distance education platforms. Lowerison et al. (2006) discussed the availability of online education provides undergraduate agriculture students the opportunity for college credit and a computer-based setting which emphasizes a multitude of instructional methodologies tailored to the individual student. This flexibility supports the popularity of online courses (Muljana & Luo, 2019) and the benefit of reducing training costs for businesses (Lee & Choi, 2011). As a result of the availability of technology students are gravitating towards less restrictive and more transparent avenues for their formal and non-formal education.

Theoretical Framework

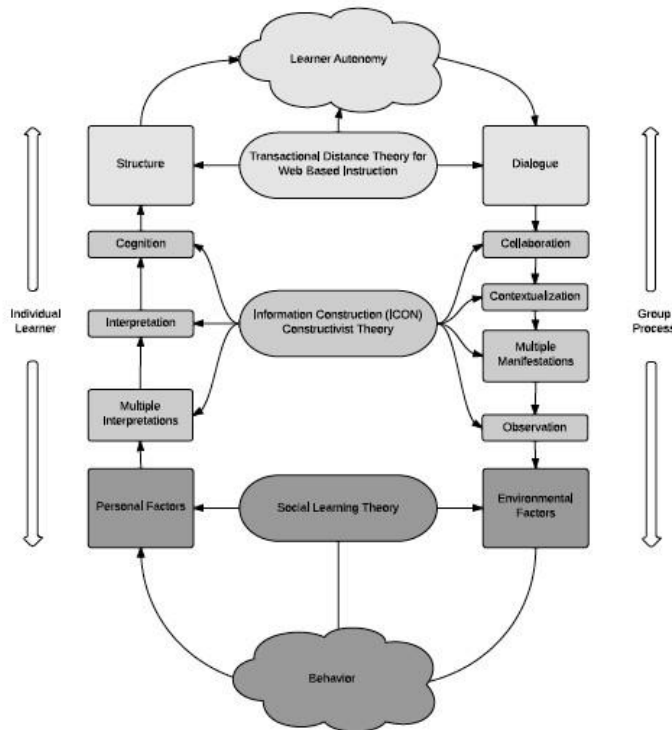
The theoretical framework for this study was structured using Moore's Transactional Distance Theory for Web-Based Instruction (1993), Black and McClintock's (1996) Constructivist Learning Model for Information Construction, and Bandura's (1997) Social Learning Theory. Moore's Transactional Distance Theory (1993) addresses the relationship between instructor and student in the e-learning environment where student and instructor are separated in both physical and location presence. Moore (1993) defined Transactional Distance Theory as "the psychological or communicative space that separates instructor from learner in the transaction between them, occurring in the structure or planned learning situation (p. 1). Jung (2001) defined Transactional Distance Theory as a pedagogical relationship in the environment of distance education. Moore (1993) identified the conception of transaction originating from John Dewey and explained by Boyd and Apps (1980) "transaction describes the interplay among the environment, the individuals, and the patterns of behavior in a situation" (p. 5). Moore (1993) identified two variables within Transactional Distance Theory where dialogue is the "interaction between the teacher and learner where one gives instruction and the other responds" (p. 4). And communication is determined by a number of instructional factors which represent the personalities of the teacher and the learner, the subject matter of the course, and environmental factors within the realm of instructional delivery. Jung (2001) further describes three elements required for distance education programs: dialogue, structure, and learner autonomy. Jung (2001) citing Moore and Kearsley (1996) identified learner autonomy as the extent to which learners make decisions about their own learning and construct knowledge based on their own experience. Moore's (1993) second variable described the transactional distance effect which are the elements of course design. Moore (1993) identified course design elements as the extent to which the course is structured in relation to the mode of instructional delivery being utilized. Moore (1993) described the element of structure as the degree of rigidity and flexibility of program objectives, teaching strategies, and evaluation methods. The role of the individual learner is also identified within the structural component by accounting for the degree of flexibility the program possesses for individual learning needs.

Black and McClintock (1996) proposed the Constructivist Learning Model for Information Construction approach related to constructivist design as an interpretation of authentic artifacts in the context of background materials. Black and McClintock's approach is observation based with authenticity at the core of student learning the application for online teaching and learning is applicable, as technology has allowed for the design of more authentic and practical experiences for distance education students. Bandura (1977) reported learning by direct experience would lead to new patterns of behavior being acquired through direct experience by observing the behavior of others. Bandura (1977) stated that through experiences the reinforcement of consequences serves as a means for informing learners what must be done to gain beneficial outcomes or avoid less favorable results. This theory is effective in the development of online learning frameworks. Favorable experiences through modeling or coaching of best practices in online learning would reinforce the desired level student interaction through the learning management system. Hislop (2006) supports the effect of experience as a measurable outcome of desired behavior as learning is inseparable from the day-to-day practices student's carry out in studies and work.

Bandura (1977) identified three components of Social Learning Theory: personal

factors: knowledge, expectations, and attitudes. Environmental: social norms, access in community, influence on others, and behavioral: skills, practice, self-efficacy. Bandura (1977) reported the use of Social Learning Theory would encourage the learner to observe and imitate the behavior of others, see positive behaviors modeled and practiced, increase their own capacity for new skill acquisition, gain confidence in the implementation of new skills, and experience support from their environment to apply newly acquired skills. The confluence of Moore’s Transactional Distance Theory for Web Based Instruction (1997), Constructivist Learning Model for Information Construction (Black & McClintock, 1996) and Social Learning Theory (Bandura, 1977) presents a proposed theoretical model for the development, implementation and reflection of both student and instructor. This model identifies the need for both students and instructors to participate in the group process as a measure of enhanced and best practice online course design and learning. The role of this model is to demonstrate the cyclical effect, whereas students, and instructors collaborate within the group process and proceed to the intrinsic level of concept and contextual understand as an individual. The student and instructor then work collectively within the larger group by sharing individual insights regarding the content being taught. Figure 1 illustrates the potential theoretical framework for student and instructor instructional processes.

Figure 1 *Theoretical Framework for Student Learning and Instructor Online Learning Processes*



Purpose and Research Questions

The purpose of this Delphi Study was to investigate the instructional needs of undergraduate agriculture students enrolled in online learning environments. To better

understand online learning needs of undergraduates two research questions guided this investigation: what are the essential components for an effective undergraduate online learning management system, and what are stakeholder perceptions of learning management system design, development, coursework, and design themes?

Methods

This study used the Delphi method for collected data related to the purpose and consisted of a three rounds investigation process using undergraduate agriculture students as the research panel. Somerville (2007) reported the Delphi as an appropriate research instrument when information can be gathered from a wide geographical area representing a diverse panel of participants, a desire for respondent anonymity, and when respondents have time to carefully consider their responses. Delp et al. (1977) in Dyer and Breja (2003) described the Delphi method as a group process used to solicit, collate, and direct responses toward reaching a consensus. Helmer (1967) reported the Delphi technique as a method of securing and refining group opinions and substituting computed consensus for an agreed-upon majority opinion. A review of the available literature revealed no appropriate Delphi study instrument available to measure undergraduate agriculture students' perception and needs of learning management systems. The instrument was organized in five areas of interest: (1) instructional design components for effective online learning, (2) online learning at Colleges of Agriculture, and (3) perceptions of online learning. The pilot test was conducted with 44 ($N = 44$) post-secondary agriculture students previously or currently enrolled in at least one online course at Southern Illinois University in the College of Agricultural Sciences. The population of the pilot study was representative of the panelists but were not included in the reporting of the finalized instrument. The pilot study response rate was 50.0%. Students were asked to provide input for the revision of test items which were ambiguous, grammatically flawed, or reflective of researcher bias. Chronbach-alpha indicated $\alpha = .857$ measure of internal consistency which was appropriate for assessing validity. At the conclusion of the pilot test the results were analyzed by the researcher and agricultural education faculty at Southern Illinois University to review recommendations and ensure accountability to the research objectives, language, and validity. The amended pilot study was returned to the pilot review panel for interrater reliability assessment. The instrument was then distributed to the undergraduate agriculture student panelists.

The selection of undergraduate agriculture students was determined using multiple strata. Panelists met meet the following requirements for inclusion in the study: undergraduate students enrolled in at least one online (asynchronous) course, junior or senior level class standing, self-identified course grade average equal to or greater than 3.00, a member of the Southern Illinois University Collegiate FFA, and declared as a College of Agricultural Science major. The rationale for selecting undergraduates enrolled in online coursework was their familiarity with the learning management systems and their role as direct stakeholders in the use and design of online coursework. The frame for this study consisted of 550 junior and senior students across all majors in the College of Agricultural Sciences at Southern Illinois University ($N = 550$) with the panel consisting of 10 ($n = 10$) panelists and represented three departments in the Southern Illinois University College of Agricultural Sciences: Animal Science, Food, and Nutrition (AFNR), Plant, Soil, and General Agriculture (PSGA), and Agribusiness Economics (ABE). Undergraduate panelist selection data was obtained by

assigning a numerical value to each of the selection variables in Table 1. Variable one identified the student’s major, variable two represents the students’ level in undergraduate education, and variable three indicates self-reported GPA. Self-reported GPA was used instead of institutional GPA as a limitation of available data from the Registrar’s office. Variable four represented participation in the Collegiate FFA (as a measure of engagement and leadership in the College of Agriculture), and variable five identified the number of online courses the student has completed. Values were assigned to each variable to determine inclusion in the panel.

Table 1

Criteria for Selection of Undergraduate College of Agricultural Sciences Students (N = 10)

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Variable	ANFN	PSGA	ABE	ANFN	PSGA	ABE	ANFN	PSGA	PSGA	PSGA
V2	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00
V3	2.96	3.18	3.14	2.83	3.00	4.00	3.16	4.15	3.04	4.00
V4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
V5	8.00	5.50	6.50	6.00	6.00	5.00	6.60	5.50	5.00	6.00
Mean V2-V5	3.74	3.42	3.66	3.45	3.50	3.50	3.29	3.66	3.01	3.50

Note. S¹⁻¹⁰= student, Var. = undergraduate agriculture major, V²=junior/senior, V³=GPA ≤ 2.80, V⁴=COAS Collegiate FFA member, V⁵=average of enrolled online COAS courses.

A mean score of ≤ 2.80 was used to select the final ten participants. Participants were contacted through email for recruitment purposes in the Delphi Study and for ensuring a more personalized approach for attracting and retaining the panelists. Dillman, Smyth, and Christian (2009) extol the virtue of personalized requests through email to establish a connection between the researcher and the respondent to invoke social exchange and draw respondents out of the group setting. Participants were asked to respond through email with their willingness to accept or decline the invitation. The Delphi process consisted of three rounds and data was collected using interval measurement scales and group consensus. The first-round instrument consisted of 29 closed-ended statements using the following scale: 1=strongly agree, 2=agree, 3=neutral, 4=disagree, and 5=strongly disagree. Round two statements were categorized in three areas as a result of round one analysis: instructional design of the LMS, online learning at Colleges of Agriculture, and perceptions of online learning. Responses deemed to be similar in nature were combined into one unifying statement and categorized accordingly (Hasson et al. 2000). Participants were asked to rank order the statements in round three.

Findings

The findings of the study are presented by Delphi round. In round one participants were provided 29 closed-ended statements in three categories: instructional design, online learning at Colleges of Agriculture, and participant perceptions of online learning. Participants (n = 10) responses were analyzed from the statements provided. Undergraduate students were provided

the instrument and asked to provide their level of agreement in each of the instrument areas. Research question one identified twelve essential statements. To better understand the instructional design components undergraduate students valued as essential to the improvement of online learning management systems student scores were evaluated using descriptive statistics (mean and median), and standard deviation. Participants reported their level of agreement based on round one statements (Table 2). In order for an item to reach group consensus, the item had to obtain a mean score of ≥ 4.5 or higher from the panelists.

Table 2

Round One Participant Responses Related to Essential Instructional Design

Item	Statement	<i>M</i>	<i>Mdn</i>	<i>SD</i>
A4	Students should be required to complete learning management system training modules prior to engaging in online coursework.	4.70	4.00	.48
A3	All Online learning software should be designed in a similar manner.	4.70	5.00	.48
A8	Online programs should be designed for ease of use by faculty for the purposes of uploading materials, discussion boards, video chat, and downloading assignments.	4.60	5.00	.51
A1	A video tutorial for effectively using the online learning management system would be beneficial for student use.	4.50	4.50	.52
A6	Learning management systems should contain options for students to identify their preferred learning style.	4.40	4.50	.69
A2	If a student identifies their preferred learning style, the learning management system should include learning modules, which reflect the students learning preference.	4.30	4.00	.48
A5	Online learning curriculum should allow for group problem solving and collaboration.	4.10	4.00	.73
A7	Online learning programs should be designed to engage students in authentic discussions and provide for accountability in their discussions.	4.00	4.00	1.0

Panelists identified (Table 3) the need for a video tutorial to effectively navigate the online learning management system would be beneficial for student use (A4), online programs should be designed for ease of use by faculty for the purposes of uploading materials discussion boards, video chat, and downloading assignments (A3), online learning programs should be designed to engage in authentic discussions and provide for accountability in their discussions (A8), and students should be required to complete learning management system training modules prior to engaging in online coursework (A1). Participants were provided eleven statements regarding online learning at Colleges of Agriculture.

Table 3

Panelist Response Regarding Online Learning at Colleges of Agriculture

Item	Statement	<i>M</i>	<i>Mdn</i>	<i>SD</i>
B11	Online learning modules should provide options for students to easily contact their instructor.	4.80	5.00	.42
B3	Faculty would benefit from an assessment of network and computer capabilities prior to designing online course.	4.70	5.00	.48
B5	Mobile and tablet applications for online learning should be developed in parallel to desktop/laptop hardware applications to allow students to more easily access coursework.	4.60	5.00	.69
B6	New and existing faculty should have opportunities for professional development workshops to increase their knowledge related to online teaching and learning.	4.60	5.00	.51
B4	Faculty should encourage students to use multiple forms of communication (email, phone, text, social media) when using the learning management system to provide quality student service.	4.50	5.00	.70
B7	New and existing faculty would benefit from an easily accessible expert to provide guidance and support for the design and implementation of online learning modules.	4.30	4.00	.48
B9	The use of graphics, video, and charts should be included in the framework for developing online learning modules.	4.30	4.00	.48
B8	Online learners should be given a variety of assessments for completing assignments and culminating projects.	4.20	4.00	.63
B10	More rigorous lessons should be developed for online courses beyond the recall (memorization) level.	3.90	4.00	.56
B1	Online curriculum is developed at a level of learning far below curriculum used in the traditional classroom.	2.80	3.00	.78
B2	Traditional classroom content should be transferred to online learning modules without any modification or formatting.	2.50	2.00	.97

Panelists indicated statements (Table 4) with a mean score of ≥ 4.5 as essential to online learning at Colleges of Agriculture. E-learning modules should provide opportunities for students to engage in relevant discussions with faculty guidance (B11), faculty would benefit from an assessment of network and computer capabilities prior to designing online coursework (B3), mobile and tablet applications for online learning should be developed in parallel to desktop/laptop hardware applications to allow students to more easily access coursework (B5), new and existing faculty should have opportunities for professional development workshops to increase their knowledge related to online teaching and learning (B6), faculty should encourage students to use multiple forms of communication (email, phone, text, social media) when using the learning management system to provide quality student service as being the most essential components for effective online learning at the collegiate level (B4).

Table 4

Round One Panelist Response Regarding Principles of Online Learning

Item	Statement	<i>M</i>	<i>Mdn</i>	<i>SD</i>
C4	Faculty should inform/discuss expectations for online learning and responsibilities with students prior to the beginning of the online course.	4.60	5.00	.70
C5	Students should expect more self-responsibility and organizational skills while enrolled in an online course.	4.60	5.00	.84
C2	Student learning styles should be assessed and considered when designing online courses.	4.50	4.50	.52
C3	Formative assessments, which periodically check for student understanding, should be incorporated into all online learning modules.	4.40	4.00	.51
C7	Faculty lack time in their schedules to develop cognitively demanding curriculum focused instruction for online learning.	3.40	4.00	.84
C6	Faculty experience great frustration with the development, implementation, and assessment of online course design and student engagement.	3.30	3.50	.95
C1	Universities should consider an additional fee to conduct professional development for faculty to learn best practices related to online course/curriculum development.	2.80	2.50	1.4

Panelists indicated essential statements with means ≥ 4.5 related to their perceptions of online learning. Faculty should inform/discuss expectations for online learning and responsibilities with students prior to the beginning of the online course (C4), students should expect more self-responsibility and organizational skills while enrolled in an online course (C5), and student learning styles should be assessed and considered when designing online courses (C2). In round two participants were provided 12 statements from the round one instrument and asked to rank order each item according their perception of importance related to online learning management systems. Two statements were removed from the second-round instrument due to mean scores outside the established range. Students should expect more self-responsibility and organizational skills while enrolled in an online course (C5) and student learning styles should be assessed and considered when designing online courses (C2). Participants strongly agreed (Table 5) that online programs should be designed for ease of use ($M = 3.40$, $S.D. = 1.83$) by faculty for uploading materials for student access. Participants also agreed that online learning programs ($M = 4.00$, $S.D. = 3.24$) should be engaging for students and mobile applications ($M = 4.80$, $S.D. = 2.29$) should be developed in parallel to the desktop LMS. Support was indicated for new and existing faculty ($M = 4.90$, $S.D. = 2.29$) to have professional learning opportunities to improve online course design and faculty should discuss expectations ($M = 5.20$, $S.D. = 3.42$) for online learning with students prior to the beginning of the course. The use of a LMS video tutorial ($M = 5.50$, $S.D. = 3.24$) for student efficiency and having an expert ($M = 6.30$, $S.D. = 2.66$) to provide guidance support for instructional design within the LMS for faculty. Participants indicated their feelings supporting enhanced discussions ($M = 6.60$, $S.D. = 1.83$) with faculty in the LMS and improved use of graphics,

videos, and charts ($M = 6.90, S.D. = 3.47$) to support instruction in the LMS. Panelists supported the need for increased formative assessment ($M = 7.40, S.D. = 1.64$) to check for understanding of course material during instruction.

Table 5

Round Two: Undergraduate Hierarchical Ordering of Online Learning Needs

Item	Rank	Statement
A	1	Online programs should be designed for ease of use by faculty for the purposes of uploading materials, discussion boards, video chat, and downloading assignments.
C	2	Online learning programs should be designed to engage students in authentic discussions and provide for accountability in their discussions.
D	3	Mobile and tablet applications for online learning should be developed in parallel to desktop/laptop hardware applications to allow students to more easily access coursework.
E	4	New and existing faculty should have opportunities for professional development workshops to increase their knowledge related to online teaching and learning.
I	5	Faculty should inform/discuss expectations for online learning and responsibilities with students prior to the beginning of the online course.
B	6	A video tutorial for effectively using the online learning management system would be beneficial for student use.
G	7	New and existing faculty would benefit from an easily accessible expert to provide guidance and support for the design and implementation of online learning modules.
F	8	E-learning modules should provide opportunities for students to engage in relevant discussions with faculty guidance.
H	9	The use of graphics, video, and charts should be included in the framework for developing online learning modules.
J	10	Formative assessments, which periodically check for student understanding, should be incorporated into all online learning modules.

Round three data analysis (Table 6) presented choices for hierarchical order of online learning needs. The instrument for round three was created through the respondents' original rank order selection from round two. Each participant received a copy of their round two selections and the option to provide comments to justify any reorganization of their choices. Each panelist was asked to review their original selection and then review all comments related to each statement to determine whether their opinion of rank had changed. If a change was made participants indicated the new rank order. Participants were asked to consider a possible change in their round two rankings after reviewing aggregated principles from their respective panel. Mean scores for each statement were used to determine the most important and least important components for online course development. The response rate for round three was 100.0 percent ($n = 10$) and indicated a 70.0 percent change from round two.

Table 6

Panelist Group Comprised of Round Three Mean Scores of Items A-J

Item	Statement	<i>M</i>	<i>SD</i>
A	Online programs should be designed for ease of use by faculty for the purposes of uploading materials, discussion boards, video chat, and downloading assignments.	4.31	2.66
C	Online learning programs should be designed to engage students in authentic discussions and provide for accountability in their discussions.	4.13	3.04
I	Faculty should inform/discuss expectations for online learning and responsibilities with students prior to the beginning of the online course.	4.48	2.70
E	New and existing faculty should have opportunities for professional development workshops to increase their knowledge related to online teaching and learning.	5.48	3.13
F	E-learning modules should provide opportunities for students to engage in relevant discussions with faculty guidance.	5.60	2.24
J	Formative assessments, which periodically check for student understanding, should be incorporated into all online learning modules.	5.68	2.62
D	Mobile and tablet applications for online learning should be developed in parallel to desktop/laptop hardware applications to allow students to more easily access coursework.	5.80	3.09
H	The use of graphics, video, and charts should be included in the framework for developing online learning modules.	6.27	2.57
G	New and existing faculty would benefit from an easily accessible expert to provide guidance and support for the design and implementation of online learning modules.	6.48	2.70
B	A video tutorial for effectively using the online learning management system would be beneficial for student use.	6.75	2.90

Conclusions, Implications, and Recommendations

The purpose of this Delphi study was to investigate the instructional needs of undergraduate agriculture students enrolled in online learning environments in Colleges of Agriculture. A representative sample of undergraduate students ($n = 10$) enrolled in online coursework at Southern Illinois University were selected for participation to address the needs of online learners enrolled in agricultural coursework in an online environment. Research questions were designed assess the essential components for an effective undergraduate online learning management system and the identification and analysis of stakeholder perceptions of factors influencing the design, development, implementation of online

coursework, and perceptions by instructional design themes. The results indicated that undergraduate students recognize the need for online programs to be designed for ease of use by students and faculty. This outcome reinforces Moore's (1993) Transactional Distance theory of addressing the relationship between student and instruction and further supports Lowerison et al. (2006) that the individual needs of students should be considered when designing online courses. Undergraduates also value the use of mobile technology for online learning and the need for formative assessment of their progress during online course instruction. Strong et al. (2013) reported similar findings and the value mobile platforms have for innovation and changing the delivery models for university coursework.

Undergraduate panelists supported Bandura's (1977) Social Learning Theory by indicating the need for faculty to have professional development opportunities to improve their design and implementation of online learning and an expert in LMS design and course delivery to answer questions related to course development. Bandura reported the importance of the learner to see the positive behaviors modeled, practices, and internal capacity improved. The continued improvement and development of appropriate coursework for agriculture majors should incorporate aspects of online teaching and learning. Future students will continue to match their skill level using technology to the abilities of hardware and software within their learning environment. Participants indicated the importance of video and interactive components and the importance of instructional videos available prior to the use of the LMS system. Black and McClintock (1996) are supportive of interactive learning environments to improve authenticity and practical experiences. This finding supports the analysis that students value online programs that are purposefully designed for uploading materials, discussion boards, video chat, and accessing assignments.

Findings indicated online learning systems typically are incomplete and do not meet the needs of the major stakeholders. A need exists to implement the findings of this study based on the needs of the students and faculty within Colleges of Agriculture. Undergraduates at Colleges of Agriculture should be provided extended or foundational training in major aspects of online course enrollment including course use and access, communication functions to enhance student and faculty collaboration, more robust formative assessment opportunities for online learning, lesson adjustment, and improved multimedia in course assignments. The use of the internet has existed in various forms for more than 30 years and will continue to reach individuals without access to higher learning opportunities. The expectations of undergraduate agriculture students and future agriculturalists will expect enhanced services through communication and interaction. Further discussion among educational theorists and agricultural educators would benefit student interaction and learning in an online environment. Opportunities exist to extend the use of the web-based learning program to become more than a repository for low engagement activities. The opportunities for faculty and students have never been more attainable. We stand at the precipice of a great revolution of learning just as educational visionaries, theorists, and countless others before our generation experienced. We must appreciate the past to meet the needs of the future.

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