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ORIGINAL PAPER

Assessment Types, Strategies, and Feedback in Online Higher Education Courses in the Age of Artificial Intelligence: Perspectives of Instructional Designers

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Abstract

This study used a survey methodology to examine instructional designer perceptions on assessment types, assessment strategies, instructor feedback, and the influence of artificial intelligence (AI) in online assessments. An online survey with 46 questions was developed and administered to instructional designers at higher education institutions. Instructional designers from multiple universities were invited to participate in the study, with one hundred and three individuals completing the survey. Results indicated that instructional designers rated case study analysis, followed by electronic portfolio, design project and multimedia project as most effective assessment types. Least effective assessment types were non-proctored exams, proctored exams, and asynchronous participation. A grading rubric was rated as the most effective assessment strategy, and ungraded assignments and automated graded assignments were perceived to be least effective. AI was recognized to be effective for creating rubrics for assessments, generating automated quizzes, and providing feedback. To address academic integrity challenges with use of AI, participants recommended administering assessments that measure higher-order thinking, incorporating authentic assessments, and utilizing synchronous sessions.

Keywords Online assessments · Artificial intelligence · Assessment types · Assessment strategies

Introduction

Assessments play a crucial role in the teaching and learning process by facilitating learning, promoting engagement, and enhancing student participation. Research on assessments is particularly important in online courses as they differ from in person courses, requiring students to complete them independently outside of the classroom. With the growing influence of artificial intelligence (AI) in online learning, and the impact they have on the instructors designing the assessments, instructional designers supporting the instructors, and online learners completing them, it is timely to examine the effectiveness of assessments in online courses. Therefore, this study explores assessment types, strategies, and feedback in online higher education courses in the age of AI. By distinguishing between assessment types and assessment strategies, instructors and instructional designers can make more intentional decisions about not only *what* to assess, but *how* to assess learning outcomes in online higher education courses.

Assessment Types

An online course can include any number of assessments but the choice of assessment should align with the specific needs and desired learning outcomes (Hooda et al., 2022). The term assessment type and assessment strategy are interchangeably used by practitioners and researchers. In

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this study, we describe *assessment types as categories of assessments used to evaluate a learner's knowledge, skills, abilities, or performance*. Assessments can be categorized into different types. Examples include writing assignments, case study analysis, quizzes, design projects etc. These focus on the structure and the nature of the tasks that learners are asked to complete with the focus on "what to assess". Heil and Ifenthaler in their systematic review, categorized assessments into four modes: peer, teacher, automated, and self (Heil & Ifenthaler, 2023). Papers, reports, reflections are commonly used as writing assignments in online courses (Conrad & Openo, 2018). These provide opportunities for students to assess the student writing skills. However, gaining such benefits from writing assignments is becoming much more challenging with the availability of artificial intelligence (AI) to assist in the writing process especially if students do not use AI to refine their writing but to copy paste text from generative AI. More traditional forms of assessment such as quizzes and exams continue to be used in online courses despite the prevalence of AI (Sewell et al., 2010; Xiong & Suen, 2018). While quizzes are helpful in providing automated feedback, these assessments are also of concern as students have the opportunity to search for the responses if they are not completed in a proctored setting. Additionally, for traditional assessments such as quizzes and exams, AI systems are being implemented to provide formative evaluation where artificial intelligence enhances the assessment process with personalized responses and intelligent tutoring systems, which can track students' progress and identify areas for improvement (González-Calatayud et al., 2021).

Authentic assessments such as case study analysis, multimedia projects, design projects and electronic portfolios are also being used in some online courses (Kearns, 2012). Games and simulations relying on the technology can also be used to assess learners in online courses (Tsai et al., 2015; Vos, 2015). Student participation in online courses are also assessed, and includes both asynchronous participation in forums (Chen et al., 2021; Fehrman & Watson, 2021) and synchronous participation in video conferencing. In addition, oral presentations include student presentations (Akkimov & Malin, 2020) and in some online courses students also have the opportunity to participate in self-assessments (Ćukušić et al., 2014). Moreover, a literature review by Gikandi et al. (2011) found that using self-assessment quizzes enhanced interactions in online settings. Their study showed that online formative assessments could promote equity in education by offering various learning opportunities tailored to meet student's diverse needs. By using a variety of assessment techniques like projects, portfolios, peer evaluations, and discussion boards with meaningful and quick feedback, the combination was valued by the instructors and students (Gikandi et al., 2011).

Assessment Strategies

In this study, we describe *assessment strategy as methods to how assessments are integrated and implemented in the online course to support and evaluate student learning*. Examples include individual student assignments, group/collaborative projects, formative assessment, summative assessment, etc. Assessment strategies focus on how assessments are designed and implemented with the focus on "how to assess". A number of strategies have been used in designing and implementing assessments in online courses. Research suggests that assessment strategies in online courses frequently emphasize formative assessments, such as regular quizzes or discussion posts, to promote engagement. Gaytan and McEwen's (2007) study showed that effective assessment strategies should include a wide range of regular assignments with clear instructions and that feedback is essential and should be provided in a timely, meaningful way. Research shows that AI applications can support assessment strategies by using sophisticated algorithms that can gauge reliability, provide automatic individual feedback, assign peer assessors based on performance and expertise, and assist instructors by providing a dashboard of student analytics which can highlight trends, flag potential issues, and suggest areas for improvement (Topping et al., 2025). Assessment strategies could include both formative and summative assessments (McVey, 2016) with formative assessments providing feedback in the learning process and summative assessments administered at the end of the instructional period. Gaytan and McEwen (2007) highlight that using formative assessments purely for accountability does not always result in meaningful learning; instead formative assessments should be used to facilitate the learning process where timely feedback is provided to the learners. Assessment strategies could also include individual assignments where students complete the work independently and group or collaborative projects where a group of students work together (Altinay, 2017; Melo et al., 2022) in online courses. Assessments could also be instructor graded, automated graded, or ungraded depending on the type of assessment (Guberman, 2021; Zampirolli et al., 2021). Students in online courses are also encouraged to complete open book assessments and at times closed book assessments depending upon the content that is being assessed (Melo et al., 2022). Peer feedback and peer evaluations for collaborative assignments can also be helpful in online courses (Marquis, 2021). Students also value the opportunity when choices are provided in assignments and instructors differentiate them for the students (Pinchot & Paullet, 2021). Students in online courses are also provided the option to revise and resubmit, or submit multiple times. And finally,

it is important to provide grading criteria/rubrics for the assessments (Conrad & Obeno, 2018). This is especially critical in online courses where the expectation has to be very clear for students so that it results in fewer questions and confusion.

Feedback

Feedback in the teaching and learning process is described as *the constructive information provided to learners about their knowledge and performance and assisting them to progress to achieving the learning outcomes*. According to Hooda et al. (2022), feedback serves different purposes in a course's learning environment, depending on the type of assessment. It can be diagnostic, formative, summative, or provided through e-assessment. Shute (2008) mentions that formative feedback should be supportive, timely, and specific to students. The review includes research showing that feedback should focus on the individual learner, enhance their learning, be manageable, and be used to improve their performance. Because each online course is unique, the kind of feedback provided will depend on the specific assessments and learning objectives established. Nevertheless, feedback plays a critical role in the teaching and learning process. It helps students recognize areas for improvement, engage in self-assessment, and apply the insights shared (Gikandi et al., 2011), while also providing instructors with valuable information about the success of their teaching methods and guiding adjustments to better address students'needs. Similarly, Bailey et al. (2015) demonstrated that incorporating authentic assessment methods, such as real-world simulations and reflective writing, enhances engagement and supports self-regulated learning in formative assessments and group projects.

Timing of feedback has been widely studied with findings highlighting its importance for effective learning. Hooda et al. (2022) found that providing students with immediate feedback leads to better outcomes compared to delayed feedback. In conjunction with frequent and timely feedback, when provided immediately or within a day, it helps students stay motivated and aligned with learning objectives. In contrast, delays of a week or more can reduce the effectiveness of the feedback. Recent research also highlights that feedback should be clear, not overly complex or ambiguous, because that can hinder student comprehension. Feedback can be delivered immediately or delayed, but immediate feedback produces more immediate gains and helps prevent feelings of frustration to help with learning. In general, the review found broad support for using immediate feedback versus delayed feedback to promote student performance.

A study by Hattie and Timperley (2007) showed that different modalities of feedback (e.g., audio, video, text) and the frequency of feedback delivery (e.g., immediate, within a day, a week, or a month) significantly influence learner engagement and performance, with immediate feedback often being more effective for skill acquisition and retention. They also argue that effective feedback clarifies expectations and helps bridge the gap between current performance and desired outcomes, enhancing learning outcomes in virtual environments. Ice et al. (2007) add that the modality of feedback shapes student engagement. For example, video and audio formats of feedback offer more personal and interactive experiences. At the same time, text feedback remains efficient and widely used. Recent research shows that students described the use of AI as a double-edged sword. Though it includes the benefits of receiving immediate feedback, they are also aware of the perceptions of cheating in assessments. Overall, they recognize that the benefits outweigh the negatives (Charles et al., 2025). Feedback is a vital component of assessments and plays a key role in enhancing student learning in online courses. Instructional designers are instrumental in higher education institutions and contribute significantly to guiding online instructors in the development of assessment and feedback practices.

Role of Instructional Designers

The role of Instructional Designers (IDs) in online courses encompasses providing guidance on various aspects, including learning theories, media selection, course design, and structure. Hart (2020) points out that IDs have specialized expertise in learning theories and instructional design models that are critical to improve online course quality. Therefore, they can ensure that the content is delivered at the appropriate level, assist in selecting appropriate assessment types and strategies, write clear assignment instructions, and align course material with the intended outcomes or objectives (Hart, 2020). IDs can also assist instructors with writing course outcomes, designing assessments, and ensuring instructional alignment (Mancilla & Frey, 2023).

IDs may use various instructional design models to analyze faculty and learner needs before assisting in the design and development of a course in collaboration with a faculty member (Kumar & Ritzhaupt, 2017). Because IDs can ensure learning levels and objectives are appropriate for students, they may be able to pinpoint areas with which learners may have issues. They can also assist with course improvements by reviewing course materials objectively and thoroughly, free from personal or emotional preferences regarding course development methods (Hart, 2020). This means that IDs may be involved throughout the entire course development process, from course conception to evaluation, including the design of assessments. Furthermore, IDs use generative AI in online courses to automate tasks such as creating rubrics, generating instructional materials (e.g., learning objectives, module overviews), and brainstorming

the development of course content, while simultaneously providing training, resources, and guidance to faculty on ethical AI integration, and addressing academic integrity concerns (Kumar et al., 2024).

IDs are the go-to guides for faculty in online courses, which makes sense because of their knowledge of learning theories and instructional design models. Therefore, they are an excellent resource to consult for effective assessments and assessment strategies. For example, they can assist faculty to determine whether to incorporate creative approaches such as weekly or end-of-course gamified quizzes to assess students'comprehension of the material. They can also assist faculty with integrating quizzes after lectures or group activities for formative assessment (Zainuddin et al., 2020).

In designing and implementing assessments for online courses, IDs can assist students and instructors in evaluating the progress of the teaching and learning process, helping to determine if additional attention is needed before advancing to a new topic (Zainuddin et al., 2020). IDs can help create online assessments by understanding the feedback given by students and faculty and their knowledge of the evaluation process in instructional design processes. IDs also use learning objectives as one of the first quality checks to ensure the assessment and instruction are focused (Morrison et al., 2012). Hence in this study, we examine the perspectives of instructional designers on assessments in online courses.

Influence of AI in Online Assessments

In addition to IDs guiding faculty with assessment types, strategies, and feedback, it has become critical for IDs to support online instructors in understanding how AI influences those online courses'assessment types, strategies, and feedback. According to Owen et al. (2023), educational assessment tools offer significant advantages, such as enhancing the precision and efficiency of assessments, delivering tailored feedback to students, and helping teachers adjust their instructional strategies to address individual student needs. They also highlight that AI can transform how education is taught and assessed, ultimately improving student learning outcomes. Because AI has the potential to change education, IDs must be aware of the tools that can be used to assist with assessments and feedback in the online course. AI can enhance educational assessment through advanced tools that automatically evaluate student writing for technical aspects such as grammar and spelling and provide nuanced feedback by identifying individual academic strengths and weaknesses (Owen et al., 2023). However, with the easy access to AI tools it has also resulted in concerns regarding academic dishonesty (Abd-Elaal et al., 2019). Additionally, Luo et al. (2024) found that IDs were concerned about the quality and accuracy of instructional material created with the use of generative AI. Amidst the challenges, AI does assist with automated assessments and quick feedback to the online learners (Swiecki et al., 2022).

Purpose of the Study and Research Questions

There is a need to explore online assessments from the perspective of IDs, particularly in light of the increasing influence of AI on assessment practices in online courses. This study aims to examine instructional designer perceptions of the effectiveness of learner assessments in online higher education. A distinctive contribution of this study is the focus on ID perspectives on assessments in online courses in the evolving context of AI. As AI continues to influence online learning, both instructors and IDs are compelled to reevaluate existing assessments being used in online courses. This study seeks to add to the literature and offer new insights for IDs and instructors on the design of online assessments in the age of AI. Specifically, this study answers the following research questions:

1. What assessment types and assessment strategies are considered effective by instructional designers in online courses in higher education?
2. What modality and frequency do instructional designers at higher education institutions recommend using to provide feedback to online learners?
3. What online assessment types and assessment strategies used in higher education settings are correlated with instructional designer characteristics?
4. How does the integration of artificial intelligence (AI) influence assessments in online courses in the higher education setting?

Methods

This study used a survey based research method with Likert scale questions as well as open ended questions to address the research questions.

Participants

A total of 155 IDs participated in the survey. However, some participants exited the survey immediately after completing the consent form, resulting in missing data. After excluding these cases, the data involved responses from 103 participants. Of those, 63 (61.2%) were female, 16 (15.5%) were male, and 24 (23.3%) chose not to answer the gender question. The majority of participants identified themselves as being instructional designers ($n = 29$, 28.2%) or senior (lead) instructional designers ($n = 16$, 15.5%). Other titles included director of a learning technology center at their respective institution (n = 16, 15.5%)

or content/curriculum developer ($n = 4$, 3.9%). In terms of online course design expertise, more than half of participants rated themselves as competent ($n = 11$, 10.7%), proficient ($n = 23$, 22.3%), or expert ($n = 41$, 39.8%). On average, participants had 11.42 years of experience as instructional designers ($SD = 7.91$) and 10.79 years of experience in online course design ($SD = 6.88$). The average age was 48.44 years, with a minimum of 27 and a maximum of 75.

Survey

The research team conducted an in-depth literature review to design a survey focused on assessment types and strategies used by online instructors in higher education (Bolliger et al., 2024). This survey included assessment types, strategies, feedback, and demographic information, and questions on the influence of AI in online assessments. Eight expert reviewers, including two research methodologists, two experienced online instructors, and two senior instructional designers, evaluated the survey, providing revisions in the rating scale, items, and demographic questions for the final survey. Additionally two advanced doctoral students provided feedback on the survey items. The final survey included 46 questions across four sections. (15 assessment types, 13 assessment strategies, 3 questions on feedback, and 10 demographic questions). The survey used a 5-point Likert scale for effectiveness with 1 = *not effective* to 5 = *extremely effective* for assessment types and assessment strategies. It also included five open-ended questions. Two open-ended questions asked other online assessment types and assessment strategies not listed that they had used, and three open-ended questions were on the influence of AI on assessment types, strategies, and feedback.

Data Collection

Approval was obtained from the institutional review boards at two institutions where researchers were employed. Data was collected from IDs through several sources. First, IDs employed at two southeastern universities in the United States were invited to participate in the study. Secondly, participants were also recruited through a listserv of three professional organizations. These professional organizations included the Quality Matters ID email list, Educause ID community email list and Professional and Organizational (POD) Network Email List. Thirdly, IDs on five social media groups for IDs on two different platforms LinkedIn and Facebook were invited to complete the survey. The respondents had an opportunity to participate in a random drawing of one of five $20 gift cards from a large online retailer.

Data Analysis

The first two research questions were addressed using descriptive statistics such as the mean and standard deviation, along with frequency tables. To answer the third question, Spearman correlations were used to evaluate the relationships between instructional designers' perceived effectiveness of each assessment type and strategy, and their demographic variables, including age, years of experience as IDs, and years of experience designing online courses. To respond to the fourth research question, the responses to the open-ended questions on assessment types, assessment strategies, AI influence on assessment types, assessment strategies and feedback were open-coded and frequencies were calculated (Saldaña, 2021). The lead researcher conducted the initial round of coding, employing an inductive, manual approach to analyze responses to all five open-ended questions. This process allowed categories to be formed when multiple related codes emerged. Following the initial category development, the results were presented and discussed in a collaborative meeting with the other members of the research team. The team provided critical feedback, assisting in refining category definitions. This iterative process strengthened the trustworthiness of the findings through researcher triangulation and collective validation of the coding process.

Results

Effectiveness of Assessment Types

Table 1 presents the frequency distribution of participants'perceived effectiveness of various assessment types. As noted in Table 1, some IDs reported that they had never used certain assessment types. Thus, the mean and standard deviation in the first column of Table 1 were computed after removing these participants. Given the rating scale where *1* = Not Effective and *5* = Extremely Effective, a higher mean indicates that participants viewed the assessment type as more effective for evaluating student learning. Notably, roughly 10% of participants ($n = 10$) indicated they had never used proctored exams as an assessment tool for online courses. In terms of mean ratings, case study analysis received the highest value ($M = 4.11$), followed closely by electronic portfolios ($M = 3.99$), and design projects ($M = 3.99$). The assessment types with the highest and lowest mean scores are indicated in bold and are underlined, respectively. By contrast, non-proctored exams ($M = 2.72$), proctored exams ($M = 2.97$), and asynchronous participation ($M = 2.97$) were rated as the least effective assessment types.

Additional open-ended responses for assessment types were collected through the question "What other types of

Table 1 Types of Assessment (N = 103)

Assessment Type	Not effective	Slightly effective	Moderately effective	Very effective	Extremely effective	*M (SD)*	Never used
Writing assignments	0 (0.0%)	9 (8.7%)	33 (32.0%)	45 (43.7%)	13 (12.6%)	3.62 (0.83)	3 (2.9%)
Case study analysis	2 (1.9%)	0 (0.0%)	12 (11.7%)	58 (56.3%)	29 (28.2%)	**4.11 (0.76)**	2 (1.9%)
Quizzes	6 (5.8%)	35 (34.0%)	34 (33.0%)	14 (13.6%)	11 (10.7%)	2.89 (1.08)	3 (2.9%)
Exam (non-proctored)	10 (9.7%)	34 (33.0%)	33 (32.0%)	13 (12.6%)	7 (6.8%)	2.72 (1.06)	6 (5.8%)
Exam (proctored)	8 (7.8%)	22 (21.4%)	36 (35.0%)	19 (18.4%)	8 (7.8%)	2.97 (1.07)	10 (9.7%)
Multimedia project	1 (1.0%)	2 (1.9%)	21 (20.4%)	51 (49.5%)	26 (25.2%)	3.98 (0.80)	2 (1.9%)
Electronic portfolio	1 (1.0%)	4 (3.9%)	21 (20.4%)	40 (38.8%)	31 (30.1%)	3.99 (0.90)	6 (5.8%)
Design project	1 (1.0%)	6 (5.8%)	18 (17.5%)	39 (37.9%)	32 (31.1%)	3.99 (0.94)	7 (6.8%)
Student presentation	0 (0.0%)	7 (6.8%)	25 (24.3%)	40 (38.8%)	29 (28.2%)	3.90 (0.90)	2 (1.9%)
Reflection	3 (2.9%)	12 (11.7%)	33 (32.0%)	36 (35.0%)	17 (16.5%)	3.51 (1.01)	2 (1.9%)
Simulation	0 (0.0%)	3 (2.9%)	27 (26.2%)	42 (40.8%)	25 (24.3%)	3.92 (0.81)	6 (5.8%)
Educational online game	4 (3.9%)	27 (26.2%)	35 (34.0%)	19 (18.4%)	14 (13.6%)	3.12 (1.10)	4 (3.9%)
Self-assessment	7 (6.8%)	19 (18.4%)	43 (41.7%)	21 (20.4%)	11 (10.7%)	3.10 (1.05)	2 (1.9%)
Asynchronous participation	8 (7.8%)	30 (29.1%)	31 (30.1%)	23 (22.3%)	10 (9.7%)	2.97 (1.11)	1 (1.0%)
Synchronous participation	4 (3.9%)	24 (23.3%)	37 (35.9%)	24 (23.3%)	10 (9.7%)	3.12 (1.02)	4 (3.9%)

Table 2 Assessment Types Open-Ended Responses

Assessment Type	Example Respondent Quote	Frequency
Authentic assessment	Authentic assessment portfolio	3
Discussion Board	Discussion Boards with responses are required	3
Social annotations	Social annotation—potential for all three types of interaction	3
Gamified assessments	EdPuzzle to formatively assess and monitor progress	2
Experiential learning projects/community-based projects	Experiential learning with a real work/application component	2
Field activities, experiments, practicum, capstone	Projects and capstones	2
Poster projects (e.g., padlet)	The use of software such as Padlet	2

online assessments that you consider effective do you recommend to online instructors?" Forty-three responses were received but not all responses were aligned with the other assessment types. Responses mentioned by more than one respondent are compiled in Table 2 and frequencies were calculated based on the respondents who mentioned the assessment type. Additional responses to the open-ended question mentioned by single respondents included oral discussion, free-range assessments, two-stage exams, interviews with professionals, audio visual discussions, concepts or mind-maps, role playing discussions, problem-based learning assignments, infographics, and presentations.

Effectiveness of Assessment Strategies

Table 3 summarizes participants' ratings of the effectiveness of various assessment strategies. Similar to assessment types in Table 1, some IDs reported that they had never used certain assessment types. Thus, the mean and standard deviation in the first column of Table 3 were computed after removing these participants. Grading rubrics/criteria was rated as the most effective strategy for evaluating student learning ($M = 4.13$), with most participants selecting "moderately effective", "very effective" or "extremely effective." Other strategies rated highly included multiple attempts/submissions ($M = 3.87$) and formative assessment ($M = 3.83$). By contrast, ungraded assignments ($M = 2.62$) and automated graded assignments ($M = 2.72$) received the lowest ratings, followed by open book/note assessments ($M = 3.06$). Instructor-graded assignments were rated moderately effective ($M = 3.74$), whereas peer feedback ($M = 3.30$) and peer evaluation ($M = 3.26$) were viewed as less effective.

Additional open-ended responses on assessment strategies were collected through the question "What other online assessment strategy that you consider effective do you recommend to online instructors?" Fifty-two responses were

Table 3 Assessment Strategies (N = 103)

Assessment Strategy	*Not effective*	*Slightly effective*	*Moderately effective*	*Very effective*	*Extremely effective*	*M (SD)*	*Never used*
Individual student assignments	0 (0.0%)	5 (4.9%)	24 (23.3%)	45 (43.7%)	13 (12.6%)	3.76 (0.78)	0 (0.0%)
Group/collaborative project	1 (1.0%)	12 (11.7%)	42 (40.8%)	31 (30.1%)	1 (1.0%)	3.22 (0.74)	0 (0.0%)
Formative assessment	0 (0.0%)	5 (4.9%)	20 (19.4%)	47 (45.6%)	15 (14.6%)	3.83 (0.78)	0 (0.0%)
Summative assessment	0 (0.0%)	3 (2.9%)	32 (31.1%)	43 (41.7%)	9 (8.7%)	3.67 (0.71)	0 (0.0%)
Instructor graded assignment	0 (0.0%)	1 (1.0%)	33 (32.0%)	41 (39.8%)	12 (11.7%)	3.74 (0.71)	0 (0.0%)
Ungraded assignment	14(13.6%)	26 (25.2%)	26 (25.2%)	16 (15.5%)	3 (2.9%)	2.62 (1.08)	2 (1.9%)
Automated graded assignment	3 (2.9%)	33 (32.0%)	36 (35.0%)	13 (12.6%)	1 (1.0%)	2.72 (0.81)	1 (1.0%)
Open book/notes assessment	2 (1.9%)	24 (23.3%)	32 (31.1%)	23 (22.3%)	5 (4.9%)	3.06 (0.94)	1 (1.0%)
Differentiated assignment	1 (1.0%)	8 (7.8%)	21 (20.4%)	40 (38.8%)	15 (14.6%)	3.71 (0.91)	2 (1.9%)
Peer feedback	1 (1.0%)	13 (12.6%)	38 (36.9%)	29 (28.2%)	6 (5.8%)	3.30 (0.85)	0 (0.0%)
Peer evaluations	3 (2.9%)	11 (10.7%)	38 (36.9%)	29 (28.2%)	5 (4.9%)	3.26 (0.88)	1 (1.0%)
Grading rubrics/criteria	0 (0.0%)	1 (1.0%)	19 (18.4%)	35 (34.0%)	32 (31.1%)	**4.13 (0.79)**	0 (0.0%)
Multiple attempts/submissions	0 (0.0%)	5 (4.9%)	25 (24.3%)	31 (30.1%)	24 (23.3%)	3.87 (0.90)	2 (1.9%)

Table 4 Assessment Strategies Open-Ended Responses

Assessment strategies	Example Respondent Quote	Frequency
Peer assessment	Peer feedback with rubric criteria	8
Collaborative assessment	Collaborative notes or collaborative student work (e.g., Jamboard, Zoom Whiteboards)	6
Synchronous sessions for assessments (small group/one on one)	Use synchronous sessions for active learning assessments	3
Progressive assignments (submitted in parts)	Progressive assignments (parts are done each week, allowing feedback to students and a chance to improve individual parts in the final submission)	2
Opportunity to revise and resubmit	Revise and resubmit when it is instructor-graded	2
Feedback on drafts/frequent and thorough feedback	Revise and resubmit when it is instructor-graded	2

received but not all responses were aligned with the other assessment strategy. Appropriate responses mentioned by more than one respondent are compiled in Table 4 and frequencies were calculated based on the respondents who mentioned the assessment strategy. Additional responses from individual respondents regarding other assessment strategies included adaptive assessments, options for assessment, video-based feedback, alternative grading, contract grading, non-proctored/untimed assessments, multiple days to take exams, using question banks, provision of criteria and student-graded assessments.

Modality and Frequency of Feedback

When asked about the preferred modality to provide feedback to learners, the majority of instructional designers recommended text ($n = 80$, 77.7%) (Table 5). A significant number of participants also indicated audio ($n = 64$, 62.1%) and/or

Table 5 Modality and Frequency of Feedback

Variable	*N* (%)
Modality for feedback	
Text	80 (77.7%)
Audio	64 (62.1%)
Video	61 (59.2%)
Other	21 (24.1%)
Missing	16 (15.5%)
Feedback frequency	
Within one week	56 (54.4%)
Within one day	8 (7.8%)
Immediately	4 (3.9%)
Other	19 (18.4%)
Missing	16 (15.5%)

video ($n=61$, 59.2%) were good feedback modalities. Many responses in the "other" open-ended question suggested a combination of these choices. Regarding the timely feedback for major feedback, more than half of the participants believed it should be provided within one week ($n=56$, 54.4%).

Correlations between Assessment Types and Strategies and Participants' Demographics

A series of correlational analyses were conducted between all assessment types and strategies considered and the IDs' demographic variables (i.e., years of experience and age). However, only statistically significant results are reported. The Spearman correlations showed a significant negative relationship between group/collaborative projects and both years of experience designing online courses, $r(n=78)=-0.273$, $p=0.016$ and age, $r(n=73)=-0.233$, $p=0.047$. By contrast, years of experience as ID revealed a positive correlation with both differentiated assignments, $r(n=76)=0.247$, $p=0.032$ and multiple attempts/submissions, $r(n=76)=0.228$, $p=0.047$.

Influence of AI on Perceived Effectiveness of Assessment Types, Strategies

Two open-ended questions were included for participants to share how AI influenced their use of assessment types and strategies. One hundred and eleven responses were received. Responses to both questions were combined due to a significant overlap and are provided in Table 6. Three themes emerged through open coding (Creswell, 2009; Flick, 1998): the use of AI, alternatives, and challenges. The most frequent responses in each of the three themes included the use of AI to create rubrics, assessments where students have to use higher-order thinking skills, and concerns pertaining to academic integrity. Table 6 includes categories that emerged from multiple respondents.

Single respondent responses on AI uses included designing assignments to prepare students to use and interact with AI ethically, providing AI generated feedback,

integrating AI to facilitate student thinking, using AI to enhance writing skills, providing frequent formative assessments, providing AI attribution for work completed using it, providing peer feedback vs. AI feedback, students proving the validity of AI generation,

assessments to incorporate AI intentionally, AI to help with assessment ideas,

attributing AI-generated work/differentiating from own work. Single respondent responses on AI alternatives included live and collaborative work.

Single respondent responses on AI challenges included automated grading reduces instructor engagement, instructors providing feedback at various stages of the assignment, faculty members not ready to give up their favorite assessment type(s), and ineffectiveness of current assessment strategies.

Influence of AI on Feedback

One open-ended question asked participants to provide comments regarding how the integration of AI influenced feedback. Fifty one respondents completed this question. Of those who used AI for feedback, the most frequent response was that giving feedback was quicker or saved time.

Single respondent responses included AI used to provide feedback in multiple formats, AI used to generate feedback using prompts, AI used to grade, AI used to create rubrics, AI to provide canned and automated feedback, AI to summarize responses for feedback, AI used to create feedback banks, using AI to identify rubric focused areas for improvement, and using AI to provide meaningful, positive, and targeted feedback.

While the items in Table 7 focused on AI influence in providing feedback, there were few additional responses that did not specifically address feedback. Instead, they focused on the unethical nature of AI, and acceptable and unacceptable student use of AI for assignments.

Discussion

Many IDs who are working at higher education institutions are responsible for supporting online instructors in a collaborative effort. One of their many roles includes teaching and assisting faculty members to plan and develop assessments. This includes selecting assessment types and strategies that fit learning goals of online courses (Ritzhaupt & Kumar, 2017). The International Board of Standards for Training, Performance, and Instruction developed a set of competencies for IDs, and the design of assessment plans is a critical skill for IDs (Koszalka et al., 2013; Sims & Koszalka, 2008). However, there is a lack of literature on which online assessments are considered effective or not effective by experts who serve in higher education settings. Therefore, it is important to investigate IDs perspectives on online learner assessments.

Most and Least Effective Assessment Types and Assessment Strategies

Results in this study showed that IDs rated case study analysis, followed by electronic portfolio, design project and multimedia project, to be the most effective assessment types. Least effective assessment types were non-proctored exams, proctored exams, and asynchronous participation. These important findings show instructional designers' preferences for using project-based assessments. Zen et al. (2022) found that project-based learning increased student engagement and their academic performance. Interestingly, our participants

Table 6 AI Influence on Assessment Types and Strategies

AI Influence	Example Respondent Quote	Frequency
Uses		
Using AI to create grading rubrics	It has helped me create grading rubrics based on the requirements of the assignment	5
Use of machine graded/automated graded quizzes and feedback	I am seeing a movement towards more machine-graded quizzes	3
Providing guidelines on the use of AI	Work with faculty has increased to re-design assessments, create rubrics, and clear guidelines for the use of AI	2
Virtual simulations (conversational AI avatars)	It has allowed for richer virtual simulations through Conversation AI Avatars	2
AI as part of the feedback process	Students prefer to have automatic feedback on quizzes and exams. They like the feedback they receive through the plagiarism tool, Shadow Health, audio presentations, and so many other AI tools used at our university	2
Alternatives		
Higher-order thinking assessments (e.g., analyzing, describing personal experiences)	Major assessments should now require higher order thinking as well as student contributions that AI cannot create, such as analyzing preconceptions, describing personal experiences, or applying learning to their own work	8
Authentic assessments	On the student side, AI has created the ability for students to let the AI do the thinking for them, particularly on written assignments. This makes more authentic assessments much more necessary and important	7
Conducting oral exams (e.g., synch check-ins)	I've started recommending a variety of"oral exams"—required synch video check-ins—so that the students can see there is a real person behind the prompts	7
Application focused assessments (project-based learning, portfolios, experiential projects)	Depending on institutional policies, instructors want to use more project-based and portfolio approaches	5
Requiring submission in draft stages and just not the final output (e.g., during writing an essay)	These should often be assignments that have a series of drafts or versions, rather than a one-time assessment	3
Discussions (progressive, personal, and requiring conversational exchange)	Discussion boards are harder than ever to assess unless they're progressive, personal, and require conversational exchange between students. If it's just a core post reiterating foundational info from readings, the ability to tell if it's really a student's own work is low	2
Assignments to be more reflective	We suggest that faculty change assignments to be more reflective and less simply something that a student could respond to by putting in an AI prompt	2
Challenges		
Academic integrity concerns (e.g., verifying the work submitted)	Faculty have stepped up their concerns and control for academic integrity. This has been a positive change	9
Not using AI yet	Not using AI at this time	7
Challenges in assessing student writing	AI has negatively affected the writing assignments because students are plagiarizing. (using AI to write their assignments and discussions)at a rate that I have never seen before	3

Table 7 AI Influence in Providing Feedback

Responses	Example Respondent Quote	Frequency
Not Used		8
AI increases speed in giving feedback/saves times	It is helpful to give feedback, it saves time	5
AI to formulate and refine feedback	AI can help refine feedback—but it cannot be used as the sole means of giving feedback	2
AI used to provide preliminary/first round of feedback	AI can be leveraged for certain feedback—but still requires that the feedback be reviewed/edited by the instructor	2

rated non-proctored and proctored exams to be least effective. This may be for two reasons. With access to generative AI such as Chat GPT students may easily find responses to non-proctored exams (Susnjak & McIntosh, 2024), and proctored exams bring up privacy concerns (Coghlan et al., 2021). Results in a study conducted by Bolliger et al. (2024) showed similar results when online instructors were asked to rate various assessment types. Online instructors who participated rated design and multimedia projects, and case study analysis as *very effective* assessment types, and non-proctored exams and self-assessments as least effective.

Participating IDs rated the use of grading rubrics as most effective, whereas ungraded and automated graded assignments were perceived to be least effective assessment strategies. Grading rubrics are often perceived as important in teaching and learning, and therefore experts recommend their use for written assignments and discussions (Kearns, 2012). Results of a study with online instructors indicated participants rated ungraded assignments and peer feedback as the least effective (Bolliger et al., 2024). In another study (Bolliger & Martin, 2021), results showed that 87.6% of IDs used grading rubrics *often* or *always* in their practice. Contrary, only 60.3% of IDs used self-assessment options *often* or *always*. However, IDs used self-assessments more frequently than online instructors. It is a significant finding that IDs in higher education who are considered experts in the design and development of online assessments ranked these assessment types and strategies as most and least effective. These results can guide other practitioners in their use of assessments in online courses.

Influence of Artificial Intelligence on Assessments

Ch'ng (2021) points out that AI can free educators from basic tasks which allows them to focus on more advanced processes. The author indicates AI may be used for the creation of a variety of multimedia content such as text, images, video, and audio. Additionally, AI cannot only be used to assess learner performance by generating question banks for quizzes and tests but also to assess feelings and behaviors. In this study, however, participants used AI mostly to create grading rubrics for assessment and automated quizzes and feedback. Luo et al. (2024) who conducted a mixed-methods study to investigate IDs' use and perceived usefulness of generative AI tools found similar results. IDs who used generative AI found it particularly useful for writing performance objectives. While participants considered generative AI useful to create assessment instruments and evaluation plans useful, they were used less frequently. Qualitative results showed IDs also used generative AI to generate assessment content such as grading rubrics and question banks. Our results beg the question of why IDs are not using AI for more high-level tasks. Perhaps some of these tools are still too new for users to be comfortable with more advanced features. Owan et al. (2023) suggests providing educators with support and training opportunities for the effective integration of AI tools.

It is significant that our respondents recommended administering assessments where higher-order thinking skills are measured. They believe that the use of authentic assessments and synchronous sessions can be valuable in online environments in the age of AI. These recommendations are similar to those made by Hodges and Kirschner (2024). Educators adopt different assessment strategies in the era of generative AI. For example, instructors may use oral exams or presentations. Assignments may be more personalized or may include specific elements such as discussions. Educators can design assessments that require learners to use higher-order thinking skills in order to achieve higher-level educational goals as developed by Bloom (1956) such as analysis, synthesis, and evaluation. Other strategies that can be used are peer reviews, collaborative projects, and frequent low-stakes assessments.

AI related challenges in this study included academic integrity concerns. AI has raised many serious ethical issues for academia, and there are many automatic article generators that learners may use to complete assessments such as literature reviews, research papers, books, and so forth (Sharples, 2022). While the authors mention it can be very difficult to detect works generated by AI tools, it is becoming critical to provide specific practices for educators to detect and prevent plagiarism. One of these practices points towards much needed training for educators to detect papers generated by AI tools. Similarly, AI can be used by students to complete exams and quizzes (Susnjak & McIntosh, 2024).

Limitations and Future Research

Some limitations of the study need to be pointed out. Although participants were solicited from two southeastern higher education institutions in the U.S. in addition to two professional organizations and five social media groups, the study could be considered geographically limited. The sample size ($N = 103$) was relatively small, and the data were self-reported. Lastly, respondents were volunteers whose opinions may have differed from individuals who did not complete the survey.

Other researchers may replicate the study with participants from different geographical regions in the U.S. or countries and may include multiple collection sites to increase the sample size. Future research may include different populations such as administrators or students at higher education institutions. Additionally, it would contribute to our current understanding of online assessment to investigate reasons why different populations perceive certain assessment types and strategies as more effective than others and which support structures need to be in place to use generative AI more effectively in higher education. Interviews and focus groups might assist future researchers to dig deeper into why certain assessments are considered effective and how to design effective assessments due to the influence of AI.

Conclusion

It was the purpose of the study to investigate IDs' perceptions of the effectiveness of assessments in online courses in higher education. Results indicate that IDs perceive authentic assessments where learners use higher-order thinking skills (analyze, evaluate, create) as most effective. Strategies that were considered highly effective were the use of grading rubrics, multiple submission attempts, and formative assessment. Participants mostly used generative AI mostly to create rubrics and automated quizzes and feedback, and some were concerned about academic dishonesty. Interestingly, not all participating IDs used AI to its full extent. While the results contribute to existing knowledge in the field of instructional design and technology, they also raised some important questions.

It is not uncommon for new technologies to be proclaimed to solve all of society's educational problems. And it is unlikely that AI will solve all of our current challenges. AI has a lot of potential; however, it is unfortunate that a new technology with so much potential has the potential to be disruptive and introduces a variety of ethical concerns. Hodges and Kirschner (2024) point out that generative AI introduces some of the same issues and concerns that were associated with previous technologies used in education. The authors suggest that "it (...) may destroy the legitimacy of some long-held educational practices" (p. 195). Instead of focusing on the banishment of AI altogether, educators may consider modifying some of their strategies and consider the process of student learning when designing assessments. Another approach is to use AI to create "personalized and adaptive" assessments (Owan et al., 2023, p. 12). Mayer (2018) concurs that we should adapt "instruction to the needs of individual learners" (p. 157). Perhaps in the future AI will allow us to address these needs.

Appendix 1

Online Assessment Strategies Survey for Instructional Designers

The survey is to understand the effectiveness of assessment strategies in online courses.

Assessment Types

Instructions: Please select one answer for each of the following questions.

1. How effective are the following online assessments **types** to evaluate student learning?

	1 = not effective	2 = slightly effective	3 = moderately effective	4 = very effective	5 = extremely effective	6 = not used
Writing assignments (e.g., essays, reports, papers)						
Case study analysis (e.g., identify problems and propose solutions)						
Quizzes (e.g., short assessment)						
Exams (non-proctored) (e.g., mid-term or final)						
Exams (proctored)						

Multimedia projects (e.g., audio, video products)						
Electronic portfolios (e.g., student artifacts)						
Design projects (e.g., instructional design, artwork)						
Student presentations (e.g., reports, debates)						
Reflections (e.g., journals)						
Simulations (e.g., virtual labs)						
Educational online games (e.g., digital flash cards, scavenger hunts)						
Self-assessments (e.g., ungraded quizzes/practice tests)						
Asynchronous participation (e.g., forums)						
Synchronous participation (e.g., video chats)						

2. What other types of online assessments that you consider effective do you recommend to online instructors?

_____

3. How has the integration of Artificial Intelligence influenced the assessment types included in online courses?

_____

Assessment Strategies

Instructions: Please select one answer for each of the following questions.

4. How effective are the following online assessment **strategies** to evaluate student learning?

	1 = not effective	2 = slightly effective	3 = moderately effective	4 = very effective	5 = extremely effective	6 = not used
Individual student assignments						
Group/collaborative projects						
Formative assessments (to help students improve their performance)						
Summative assessments (to evaluate student performance)						
Instructor graded assignments (e.g., formal)						
Ungraded assignments (e.g., informal)						
Automated graded assignments (e.g., system graded)						
Open book/notes assessments						
Differentiated assignments (e.g., student choices)						
Peer feedback (e.g., informal suggestion)						
Peer evaluations for collaborative assignments (e.g., reporting individual efforts)						

Grading rubrics/criteria (e.g., scoring guidelines)						
Multiple attempts/submissions						

5.What other online assessments strategy that you consider effective do you recommend to online instructors?

_____

6.How has the integration of Artificial Intelligence influenced assessment strategies included in online courses?

_____

Assessment Feedback

Instructions: Please select one answer for each of the following questions.

7. [Frequency] How often do you recommend online instructors give feedback to learners on assignments for a regular semester course?

- Immediately
- Within one day
- Within one week
- Within one month
- Other _____

Instructions: Please mark all that apply.

8. [Modality] What modality do you recommend to online instructors to use to provide feedback to their learners ?

- Audio
- Video
- Text
- Other_____

Instructions: Please type in your answer to the following question.

9. [Timely] What do you consider timely feedback for major assignments? ____ days

10. How has the integration of Artificial Intelligence influenced feedback provided for assessments included in online courses?

_____

Instructions: Please select one answer for the question below.

Experience

11. In terms of online course design expertise, I consider myself a(n)
- Novice
- Advanced beginner
- Competent
- Proficient
- Expert

[Demographics]

Instructions: Please select one answer for each of the following questions.

12. With which gender do you identify?
- Female
- Male
- Other
- Prefer not to answer

Instructions: Please type in your answer to the following question.

13. What is your current job title? _____

Instructions: Please fill in a numerical value for each of the following questions.

14. How many years have you worked in an instructional design position?
_____ years

15. How many years have you designed online courses? ____ years

16. What is your age? ____ years

Thank you for taking the time to complete this survey. We appreciate your assistance with our research project.

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