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Augmenting Academic Efficiency: The Integration of Assessments Within the Addie Model for Pedagogical Development

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Abstract

This paper explores the integration of assessments within the ADDIE model for pedagogical development, emphasizing its crucial role in enhancing learning experiences. Through a meticulous literature review, theoretical frameworks, practical implementations, and outcomes of assessment integration are examined. Assessments, spanning formative, summative, and authentic types, are shown to be integral to each phase of the ADDIE model, promoting customized interventions, continuous improvement, and data-driven decision-making. While challenges such as resource constraints and expertise gaps exist, strategies including professional development and technology integration offer pathways to overcome them. Furthermore, actively involving learners in the assessment process, providing timely feedback, and aligning assessments with learner interests can enhance motivation and engagement, fostering intrinsic motivation and self-directed learning. This study underscores the importance of integrating assessments into the ADDIE Model, advocating for learner-centered approaches and instructional design practices.

Keywords: Instructional Technology; Instructional Design; Curriculum Development; Need Based Instructions; Summative and Formative Assessment

1 Introduction

The field of pedagogical development has seen substantial transformation throughout time, as educators and instructional designers have diligently pursued efficient frameworks to direct the creation and presentation of instructional materials (Khalil & Elkhider 2016). Khalil and Elkhider (2016) further stressed that the ADDIE framework has gained significant interest among numerous models. In addition, Ali et. al., (2021) asserted that this systematic and repetitive approach to instructional design provides a well-organized procedure for developing educational experiences that align with learning goals and accommodate the varied requirements of learners.

Incorporating assessments into the ADDIE model is of huge relevance for pedagogical growth (Ali et. al., 2021). Providing important insights into the development of learners and highlighting areas that need improvement are two of the many ways in which assessments contribute significantly to the enhancement of teaching and learning processes (Khalil & Elkhider (2016). By integrating assessments into the ADDIE framework, David and Miller (2019) observed that educators may guarantee that instructional materials are created, executed, and assessed according to the intended learning objectives. This integration as observed by David and Miller (2019) facilitates a thorough and all-encompassing approach to improving teaching methods, where assessments are not seen as an afterthought but an essential component of designing instructional materials. The integration of assessments into the Addie model allows for a thorough and all-encompassing approach to pedagogical development, where assessments are considered a fundamental element of the overall instructional design process, rather than an afterthought (Ali et. al., 2021).

The ADDIE framework is generally acknowledged as a prominent paradigm in instructional design (Ali et. al., 2021). However, a significant obstacle within this framework is the successful integration of assessments to improve pedagogical progress and educational results (Ali et. al., 2021). Although the significance of assessments in influencing instructional design and enhancing teaching and learning processes is well acknowledged, David and Miller (2019) stressed that there is a dearth of thorough guides on the seamless integration of assessments into each step of the ADDIE paradigm. The existing knowledge gap presents a substantial obstacle in guaranteeing that instructional materials align with learning goals and effectively cater to the varied demands of learners. Hence, it is important to examine and clarify efficient approaches to incorporating evaluations into the ADDIE framework to enhance pedagogical progress and promote educational advancement.

The study aims to investigate various tactics and methods for incorporating assessments into the ADDIE framework and analyze their influence on educational advancement. This study seeks to give useful insights into the successful use of assessments within the ADDIE framework by evaluating previous research, examining the strengths and limits of this integration, and proposing implications for instructional practice. This study seeks to provide significant insights into the successful use of assessments within the ADDIE framework by reviewing previous research. This paper is structured as follows: First, a thorough literature review is needed to provide an overview of the ADDIE model and examine current research on incorporating assessments into the ADDIE framework. Additionally, a methodology section will analyze the study methodology, data sources, search strategy, inclusion and exclusion criteria, and data analysis methodologies. An examination of Methods for Incorporating Assessments in the ADDIE Model, where assessment techniques are examined at every stage of the ADDIE model, such as analysis, design, development, implementation, and evaluation. A discussion and analysis section summarizes important discoveries from the literature study, evaluates the advantages and disadvantages of incorporating assessments into the ADDIE model, and explores the consequences for educational progress and academic effectiveness. Finally, include a Conclusion section that reiterates the research question and main results, emphasizes the study's contributions and significance, and proposes directions for future research.

1.1 Research Question

How can assessments be effectively integrated within the various phases of the ADDIE model to enhance pedagogical development?

2 Methodology

To explore different strategies and approaches to assessment, a systematic literature review was conducted. Applying this method can help identify the findings of current research on assessments about the ADDIE model and compare the pros and cons of assessments about each phase of the ADDIE model. A combination of literature from various academic databases (such as Education Source and ERIC) and relevant textbooks and articles related to instructional design and pedagogical development were used to complete this study. The search terms included the literature names such as 'ADDIE model,' 'assessments,' 'instructional design,' and 'pedagogical development.' Because this particular area of instructional design and pedagogical development is relatively new, all references from the articles have been searched to ensure that all the current information has been covered.

The inclusion criteria for the literature review included artifacts that speak on how assessments can be incorporated within the ADDIE model, and beyond that, on the strategies and approaches for integrating assessments in each phase of the framework. Articles and papers written in English that had been published between 1998 and 2021 were the articles and papers reviewed, while other instructional design frameworks were excluded, as only the ADDIE model was considered. Sources that did not mention the integration of assessments within the ADDIE model were excluded from this review. The findings were analyzed using a thematic analysis method, which refers to the process of identifying key themes and findings and mapping them onto the literature review. This created a guiding framework to help organize and interpret the research results and identify common strategies and approaches for integrating assessments within an ADDIE model. The process also entailed comparing and contrasting the findings from the literature to determine a comprehensive perspective on the problem.

3 Literature review

3.1 Theoretical framework

Formative Assessment:

Formative assessments, as informed by the pioneering work of Black and Wiliam (1998), constitute a core theoretical foundation of the instructional design domain (Black and Wiliam 1998). This notion enables a continuous feedback loop in the ADDIE Model, as outlined by Morrison, Ross, and Kemp (2013), and it creates an ongoing monitoring and adjustment process that pervades throughout the instructional design phase (Morrison, Ross, & Kemp, 2013). As underlined by Wiggins (1998), formative assessment plays a cardinal role in helping the instructional designer gain insight into the learner's progress, and hence, to tackle the issues at hand and simultaneously refine instructional materials iteratively (Wiggins, 1998). The infusion of the formative assessment processes in ADDIE is aligned with the dynamic and responsive nature of the instructional design framework highlighted by Dick, Carey, and Carey in 2009 (Dick, Carey, Carey, 2009).

Assessment for Learning (AfL):

Black and Wiliam (1998) describe the principles of Assessment for Learning (AfL), an instructional-oriented theoretical approach to assessment that views assessments as processes that foster learning rather than simply assessing learning. Through AfL, learners play a significant role in the assessment process and have the ability to monitor their progress (Shepard, 2000). Shepard (2000) further strengthens this theoretical orientation by adding an assessment component to the ADDIE Model that assesses learner performance to provide

feedback and guide further learning (Shepard, 2000). Moss, Girard, and Haniford (2006) further emphasize how AfL added to the ADDIE Model positions the learner in a center of learning where feedback-based assessment is used as a self-analysis technique to help learners assess where they are on the way to achieving the intended learning. This theoretical amalgamation illustrates the tremendous potential of AfL in the ADDIE Model in bringing learning experiences that are relevant and engaging to the process of teaching and learning.

3.2 Introduction to the ADDIE Instructional Design Model

The ADDIE model is a renowned framework used for instructional design and educational development (Lee & Brett, 2015). It comprises five stages: analysis, design, development, implementation, and evaluation (Arkün & Akkoyunlu, 2008). It provides a methodical and repetitive approach to developing and enhancing educational experiences (Arkün & Akkoyunlu, 2008). The five stages of the ADDIE paradigm guarantee a coherent and organized process by matching instructional materials with learning goals, accommodating varied learners, and improving overall effectiveness (Arkün & Akkoyunlu, 2008).

The analysis phase serves as the fundamental basis for all subsequent stages of the ADDIE paradigm. During this phase, instructors are expected to analyze the needs, tasks, and goals of pupils (Muruganantham, 2015). Teachers in this phase engage in the process of identifying a problem, analyzing its origin and effect, and determining the necessary learning qualities of pupils. The primary result of this step is to ascertain the precise educational goals that instructors anticipate pupils will accomplish (Muruganantham, 2015).

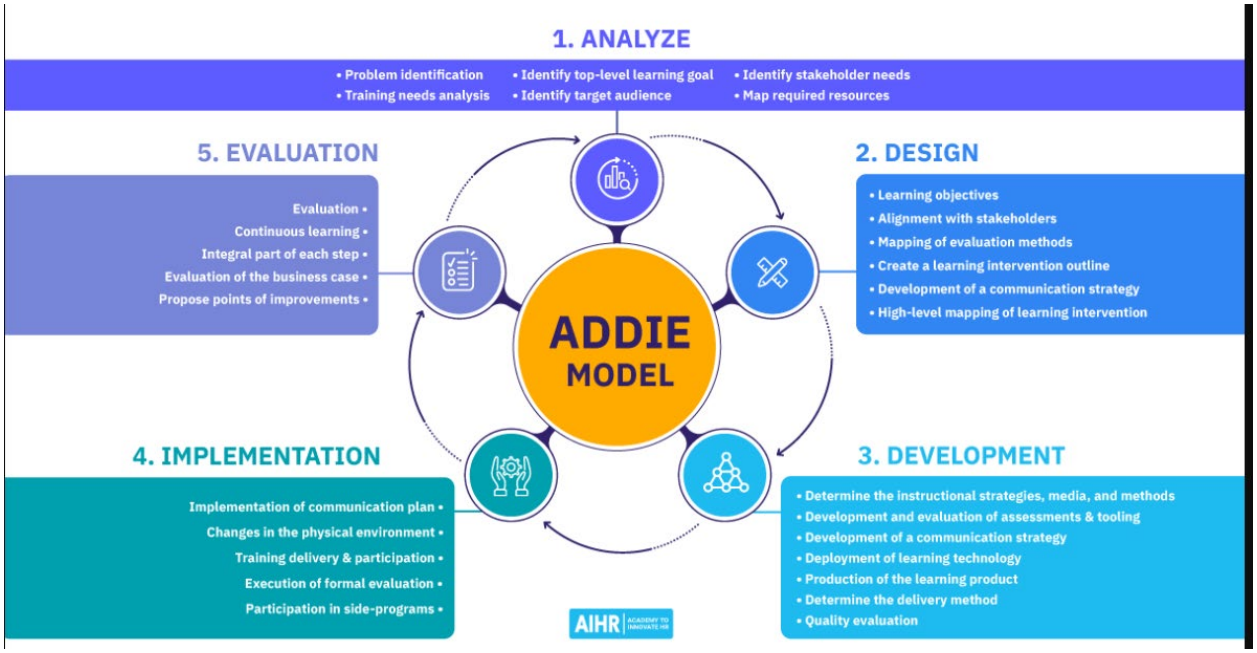
The design phase is responsible for strategizing and choosing instructional activities, resources, and evaluation techniques to ensure that students acquire the learning information and that instructional goals are successfully achieved (Arkün & Akkoyunlu, 2008). Teachers may provide a comprehensive list of instructional methodologies, resources, and technological tools, and elucidate their role in facilitating student learning and accomplishing the instructional objectives established during the analysis phase (Arkün & Akkoyunlu, 2008). The primary result of the design phase is a prototype of a lesson that encompasses the following components: a description of the target populations, a list of instructional objectives, a description of instructional activities, the estimated time needed to complete the activities, a list of instructional materials, a list of the necessary technology, and an evaluation of the components (Arkün & Akkoyunlu, 2008).

The development phase is responsible for generating the content of the prototype lesson that was designed in the previous phase (Allen, 2006). During this phase, instructors are primarily responsible for arranging the gathered learning materials and technological tools (Allen, 2006). Moreover, Arkün and Akkoyunlu, (2008) stressed that instructors can investigate how to incorporate these resources into instructional activities that are in line with the instructional goals. The lesson components are carefully developed with specific information to assist instructors in implementing them in the subsequent phase.

The implementation step pertains to the actual execution of the lesson, where it is delivered to real pupils (Allen, 2006). In this phase, the teacher's responsibility is to ensure that students comprehend the instructional materials, assist them in completing the instructional exercises, and evaluate their ability to apply the knowledge from the textbook to their own understanding (Arkün & Akkoyunlu, 2008). During this phase, it is crucial for instructors to carefully watch and record students' learning behaviors, learning performance, and learning attitudes (Allen, 2006). These observations and records serve as useful resources for the last part of the ADDIE model, which is the assessment phase (Allen, 2006).

The evaluation stage aims to assess the efficacy of the instructional activities, materials, and technological tools created in the design and development stages (Allen, 2006). During this phase, instructors must determine if the lesson aligns with the instructional aim and caters to the requirements of pupils (Allen, 2006). The evaluation step is crucial in the ADDIE approach as it enables instructors to identify any issues in their classes that may impede students' learning. This phase also empowers teachers to develop remedies and provide new learning opportunities for students (Allen, 2006; Molenda, 2003). The ADDIE model offers instructors a systematic framework to identify instructional techniques that are most likely to enhance their students' learning (Molenda, 2003).

Teachers may use the five stages of the ADDIE model to implement, assess, reflect upon, and adapt their lessons in their teaching contexts (Lee & Brett, 2015). This process also allows for the improvement of instructional techniques, course structure, and learning activities in a broader sense (Lee & Brett, 2015). The practical experiences facilitated by the ADDIE approach, whereby educators create and execute courses, enable them to develop technical and instructional expertise that is tailored to their specific teaching environments (Lee & Brett, 2015). These contextualized learning experiences enable instructors to assess the efficacy of their technology-enhanced training by analyzing students' learning performances and implementing any required modifications (Lee & Brett, 2015).



Allen, W. C. (2006). Overview and evolution of the ADDIE training system. *Advances in developing human resources*, *8*(4), 430-441.

3.3 Integrating assessments into the ADDIE Model

The analysis is the first phase of the ADDIE Model. During the analysis phase, the instructional designer determines learning needs and goals, learner characteristics, and instructional context. Assessments provide data or information about learners' knowledge, skills, and attitudes before and after the instructional period. This information can be obtained through a formative pre-assessment, such as a pre-test or diagnostic test, whereby the instructional designer can assess or determine gaps in learners' knowledge or misconceptions (Thompson & Wilson, 2016). Consequently, this information is used to inform the instructional content, learning material, and design process. Having provided formative assessments to students in the analysis phase, ID now has all sorts of information available

that can directly inform design decisions made in later phases (Davis & Miller, 2019). Formative assessments can be added in the Analysis phase that will give the instructional designer an abundance of knowledge to inform design choices for upcoming phases (Davis Miller, 2019).

During the Design phase, the instructional designer uses the information collected in the Analysis phase to create the instructional design plan. Assessments in this phase consist of establishing learning objectives and then creating assessments that are by these objectives. Assessments may include formative assessments, which provide continuous feedback to learners throughout the learning process, and summative assessments, which measure mastery of the learning goals after the instructional sequence (Adams & Brown, 2015). Aligning assessments with learning objectives is essential to correctly evaluate desired knowledge and abilities (Budoya et.al., 2019).

During the Development phase, instructional materials are created according to the design plan. Assessments are smoothly incorporated into the lessons, enabling learners to apply and showcase their comprehension of the information. These evaluations are used to verify that learners are learning the necessary information and skills (Nadiyah & Faaizah, 2015). The instructional designer gains evidence of learners' progress and may pinpoint areas needing explanation or reinforcement by integrating assessments within the teaching materials (Roberts & Davis, 2011).

During the Implementation phase, assessment plays a crucial role in monitoring learners' performance and providing continuous feedback when instructional materials are provided to them. Assessments may vary in form, including quizzes, observations, or self-assessments (Clark & Lewis, 2014). Such assessments enable the instructional designer and instructor to carefully monitor and assist learners' progress, resolve any misunderstandings or issues, and make appropriate revisions to the training offered (Jackson & Anderson, 2012). The instructional designer guarantees the congruence between instructional delivery and the targeted learning outcomes by using continuous assessments (Smith & Johnson, 2020). In the implementation phase, educators must implement assessments in a way that is equitable, reliable, and valid through activities, such as tracking standardized procedures with the administration of the test or exam, providing clear instructions for learners, and ensuring that all learners have an equal opportunity to demonstrate knowledge and skills. Educators can elicit valid information about student learning by conducting assessments. A key part of this same phase of implementation is providing feedback to learners based on their performance in the assessment. Feedback is a vital tool for learning, enabling learners to evaluate and interpret course content and offering them specific guidance on how to improve. Feedback provided in a timely and constructive manner through formative assessments supports learners in their development and allows them to progress along the learning trajectory.

Evaluation, the final phase, focuses on evaluating the overall effectiveness of the instructional design. Instructional evaluation involves the assessment of students' achievement of the proposed learning outcomes via summative assessments, such as end-of-course exams or end-of-unit oral or written performances (Brown & Jones, 2018). Such assessments are useful evidence of the extent to which instructional design has achieved its predicted learning outcomes, as well as its degree of conformity with stated objectives and goals (Jackson and Anderson, 2012). Upon thorough evaluation and analysis of the assessments and learners' performance, the instructional designer then identifies contexts where the instructional design could have been improved and makes important evaluation considerations and decisions for the next iteration of the instructional design (Johnson & White, 2017).

3.4 Exploring the role of learner participation and motivation

To examine learner participation and motivation in more detail and how they relate to the effectiveness of assessments within the ADDIE paradigm, we can consider the following methods to stimulate learner engagement and intrinsic motivation (Wang and Han, 2020). Involving learners in the evaluation process by enabling them to be actively involved in the test design or choose their desired format of assessment may enhance their sense of ownership and importance (Wang and Han, 2020). Giving immediate feedback on evaluation performance, whether at the time of or following an exam, allows the learner to track their progress and make the choice of learning interventions, accordingly, surpassing a sense of dependence and providing learners with an opportunity to demonstrate expertise (Nicol and Macfarlane-Dick, 2006).

Second, aligning assessments with learners' interests and real-world contexts might increase motivation by communicating that the information the learners are learning is highly relevant to their lives (Deci Ryan, 1985). For example, embedding case studies or simulations that approximate learners' work or home contexts may increase engagement and motivation to succeed (Herrington Oliver, 2000). Third, embedding assessments that support self-reflection and goal-setting stimulates self-directed learning and learner agency by putting learners in charge of their learning (Zimmerman, 2000).

Furthermore, assessments may be designed to engage intrinsic motivation by appealing to learners' innate curiosity or drive for competence (Ryan, 2000). For instance, by utilizing broad open-ended questions or project-based assessments that allow creativity and inquiry, one could encourage intrinsic drive and support a deeper level of engagement with content (Harlen, 2006). Assessment could encourage active information-seeking and further learning by emphasizing the inherent value of learning rather than focusing on the reward.

Overall, a few well-timed assessments can work wonders in the ADDIE model, especially by including elements that make learners feel active participants, get useful feedback promptly, and relate the content to their interests.

3.5 Practical Examples of how to use assessments in the ADDIE Model.

Analysis: During the analytical phase of developing workplace safety training, formative evaluations are used to identify areas where workers lack understanding (Smith & Johnson, 2020). Surveys and interviews are used to collect data on workers' comprehension and perspectives on safety, which then inform specific training initiatives (Muruganantham, 2015).

Design Phase: In the design phase of an online language course, evaluations are created to match the goals and learning outcomes (Adams & Brown, 2015). Pre-tests assess the competency levels of learners, which helps in customizing the curriculum accordingly. Rubrics provide uniformity in grading for tests that include subjective judgment (Roberts & Davis, 2011).

Design: During the creation phase of a middle school STEM curriculum, the assessment materials are aligned with the hands-on learning activities (Clark & Lewis, 2014). Simulations and experiments are supplemented with exercises that assess problem-solving abilities and comprehension of scientific concepts. Automated grading streamlines the process of conducting objective evaluations (Nadiya & Faaizah, 2015).

Implementation: During the implementation phase of a teacher workshop on technology integration, evaluations are included in interactive modules (Jackson & Anderson, 2012).

Quizzes and polls provide immediate feedback to track participants' comprehension and involvement in real time.

Evaluation Phase: During the evaluation phase of a leadership training program, summative evaluations are used to gauge the extent to which participants have retained and applied the ideas taught (Brown & Jones, 2018). Post-training surveys and performance assessments are used to collect feedback on the effectiveness of a program (Johnson & White, 2017). The analysis provides valuable insights for enhancing future program advancements.

4 Discussions and Findings

In the literature review, several significant findings were reported regarding assessments in the ADDIE model for pedagogical development. The ADDIE model was found to be systematic and well-structured in guiding the instructional design process for pedagogical development, and this has practical implications for integrating assessments. It has also been reported that assessments play a crucial role in pedagogical development and that by combining assessments into pedagogical development, detailed information on learning progress can be ascertained from assessment results, which can serve as feedback for instructional improvement. There is also evidence that inserting assessments into the ADDIE model can achieve greater improvement in learner outcomes, learner engagement, and instruction efficacy. Furthermore, the literature review revealed that the types of assessments differed from phase to phase as well as across different functions of the ADDIE model. While conducting assessments within each phase, specific types and considerations were to be involved accordingly, and each phase of instructional design presented different questions to be answered. Additional findings include how to align learning objectives, assessment, and the ADDIE model to better facilitate pedagogical development and enhance learner performance.

The study reports that integrating assessment components into the ADDIE model ensures that every step of the instructional design process will offer precise consideration and attention to assessments. This will lead to comprehensive and holistic approaches for designing a course, which should be considered as an overall strength in the design process. This can be achieved because assessments are being integrated as a key component of your entire instructional design process, by the time a course is designed and implemented, assessments should properly align and identify with its intended learning objectives. This can therefore lead to better, more precise, and accurate measurement of learners' performance concerning their progression and achievement of their course learning objectives. Finally, by insisting on integrating assessments into instructional design, feedback is also received during the process. The study reveals that feedback and opportunity to assess your learning process from your learners or students, can provide a great opportunity for constant improvement in materials and teaching methods. The study highlighted some of the limitations of this process when you are integrating assessments into the ADDIE model. First, it will always require more time, effort, and resources to ensure that assessments are integrated into the instructional design process. This is because you will need to engage your learners or students in the assessment process, design test, or assignment, and also ensure that you engage in the evaluation process in every step of the design process, as these processes are intertwined directly or indirectly with the overarching goal of any course you may wish to design. Second, by integrating assessments, another layer of complexity will be added to the entire instructional design process, which comes with some challenges. You may find that certain disciplines and contexts of instruction may call for very specific assessment means, as

you will not find an alignment between these contexts and what the entire ADDIE model offers you concerning your instructional design. This is not to say that such assessment means cannot be criticized, reviewed, or revised according to your specific needs.

Important implications can be drawn regarding how the integration of assessments within the ADDIE model supports both pedagogical development and academic efficiency. 1. We can make sure that the learning materials we make are in line with the learning goals and help students reach their goals by systematically incorporating assessments into the ADDIE model. For example, we could include formative (low-stakes) assessments throughout the teaching relationship and summative (high-stakes) assessments at the end. For instance, we can ensure that pedagogical content is directly relevant to what we want the students to learn and that we are providing students with adequate opportunities to apply and practice what is being covered in the instructional materials. This, in turn, improves the effectiveness of learning. 2. By systematically integrating assessments within the ADDIE model, evidence of learner performance can be generated and can be used to guide instructional decision-making in an evidence-based manner. For instance, by systematically embedding formative (low-stakes) assessments throughout the course corrections can be made as needed to improve learning performance. This evidence-based approach to instructional design improves learning quality and encourages continuous improvement within the process. When assessment is effectively integrated within the ADDIE model, teachers may be able to ensure that the learner is at the center of the instructional design process. The fact that we have systematically embedded various assessments throughout the instructional process means that we are designing a learning experience with the learner in mind. This, in turn, can lead to more personalized forms of feedback, support, and remediation, which can enable learners to facilitate and improve their learning.

5 Conclusion

This work has significantly contributed to pedagogical improvement by highlighting the need to include assessments in the ADDIE paradigm. This article offers helpful assistance to educators and instructional designers by providing practical insights on tactics and approaches for integrating assessments in each step of the ADDIE framework. It aims to improve instructional materials and optimize learner outcomes. This research emphasizes the need to consider assessments as a crucial component of the instructional design process, rather than an optional addition, to guarantee thorough and successful pedagogical improvement.

If assessments are going to be properly integrated within the ADDIE model, the key is to provide instructor training and professional development to all stakeholders in the design and implementation process. This enables the instructional designer to assist instructors in developing a culture of assessment that aligns with our learning outcomes and is carefully designed to promote the intended learning. For example, professional development offerings could include workshops, webinars, and online training courses that address such topics as assessment design, administration, scoring, and interpretation in depth. Further, professional development could lead to teacher collaborations that allow for the sharing of new information and best practices. The assessments must be integrated in such a way that instructional designers, educators, administrators, and, most importantly, students are working as a team.

The ADDIE model's main focus is on this interdependency of stakeholders. Regular department meetings, brainstorming, and feedback loops can ensure that assessments are well-vetted, relevant to instructional goals, and responsive to diverse stakeholders. Student

involvement in the design and implementation process can lead to more salient, interesting, and meaningful assessments. Leveraging technology can significantly enhance the efficiency of assessment administration within the ADDIE model. Technology provides both online platforms and tools to streamline the process of building, delivering, and grading assessments, and these can help to support data collection and analysis that facilitate more informed judgments about student performance. Technology-enabled assessment can support opportunities for immediate feedback for students, which is critical for formative assessment practices. It can also support the benefits of incorporating multimedia, interactivity, and even adaptive assessment to enhance the authenticity and engagement of assessments.

Assessments can face challenges due to limitations in resources such as time, money, and technological solutions. Open educational resources can help cut costs while proving successful. A lack of expertise in assessment design can create barriers. Professional development opportunities and assessment experts can help address this. Competing priorities from instructional design can set up barriers if assessment is not used as a guidepost for informed decisions. Technological barriers, such as software and infrastructure, can hinder practical or quick online assessments. A functional technological barrier-breaker solution is investing in technology-based solutions like learning management systems and training people to navigate these solutions. This ensures assessment leads to instruction and produces sound pedagogical development and learning outcomes for students.

This study offers a valuable framework for reflecting on where assessments are most suitably incorporated into this model. In addition, some areas warrant further research. Studies could explore specialized challenges and considerations related to embedding assessments within instruction at different levels, especially when working with educators at the pre-service, in-service, or higher education levels across diverse disciplines. Second, given the multiple assessment methods emerging as essential for diagnosing learners' needs and effectively planning and measuring learning, researchers could evaluate how adding formative, summative, authentic assessments, etc. to the ADDIE framework influences its efficacy and adds to instructional efficiency and educational outcomes. Third, researchers could explore how current technology applications support or function within an ADDIE model that integrates assessments. Moreover, they could examine the degree of teachers' professional learning opportunities and their engagement with sophisticated and meaningful assessment measures. Lastly, researchers could explore ADDIE’s long-term impact on student learning in the classroom.

References

Adams, G., & Brown, M. (2015). Assessment and evaluation in instructional design: A systematic review. *Educational Technology Research and Development*, 63(6), 1029-1052.

Ali, C. A., Acquah, S., & Esia-Donkoh, K. (2021). A Comparative Study of SAM and ADDIE Models in Simulating STEM Instruction. *African Educational Research Journal*, *9*(4), 852-859.

Allen, W. C. (2006). Overview and evolution of the ADDIE training system. *Advances in developing human resources*, *8*(4), 430-441.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: principles, policy & practice*, *5*(1), 7-74.

Brown, A. H., & Green, T. D. (2019). *The essentials of instructional design: Connecting fundamental principles with process and practice*. Routledge.

Budoya, C., Kissaka, M., & Mtebe, J. (2019). Instructional design enabled agile method using ADDIE model and feature driven development method. *International Journal of Education and Development using ICT*, *15*(1).

Clark, M., & Lewis, J. (2014). Enhancing instructional design through assessment integration: A case study. *Journal of Educational Technology Systems*, 42(4), 397-414.

Davis, E., & Miller, R. (2019). The role of assessment in the ADDIE Model: *A literature review. Journal of Educational Technology, 42(1), 78-94.*

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Plenum Press.

Dick, W., Carey, L. and Carey, J. (2009) The systematic design of instruction. 7th Edition, Pearson Higher Education Inc., Upper Saddle River, NJ, USA.

Garcia, L., & Lee, J. (2013). Assessment and the ADDIE Model: Exploring the link between theory and practice. *Journal of Applied Instructional Design*, 17(1), 20-35.

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments. *Educational Technology Research and Development, 48(3), 23-48*.

Jackson, S., & Anderson, D. (2012). Assessment in the ADDIE Model: Strategies for effective integration. *Journal of Educational Technology and Society*, 15(3), 204-215.

Khalil, M. K., & Elkhider, I. A. (2016). Applying learning theories and instructional design models for effective instruction. *Advances in physiology education*.

Molenda, M. (2003). In search of the elusive ADDIE model. *Performance improvement*, *42*(5), 34-37.

Morrison, G. R., Ross, S. M., Kalman, H. K., & Kemp, J. E. (2013). Designing Effective Instruction (7th ed.). *Hoboken, NJ: John Wiley & Sons, Inc*.

Moss, P. A., Girard, B. J., & Haniford, L. C. (2006). Chapter 4: Validity in educational assessment. *Review of research in education*, *30*(1), 109-162.

Muruganantham, G. (2015). Developing of E-content package by using ADDIE model. *International Journal of Applied Research*, *1*(3), 52-54.

Nadiyah, R. S., & Faaizah, S. (2015). The development of online project based collaborative learning using ADDIE model. *Procedia-Social and Behavioral Sciences*, *195*, 1803-1812.

Nicol, D., & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. Studies in Higher Education, 31(2), 199-218.

Roberts, K., & Davis, H. (2011). Evaluating the integration of assessment into the ADDIE Model of instructional design. *Journal of Interactive Learning Research*, 22(4), 447-464.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions*. Contemporary Educational Psychology, 25(1), 54-67.*

Shepard, L. A. (2000). The role of assessment in a learning culture. *Educational researcher*, *29*(7), 4-14.

Wang, Y., & Han, X. (2020). Effects of Student-Centered Learning on College Students' Learning Motivation: *A Meta-Analysis. Educational Psychology Review, 32(2), 365-396*.

Wiggins, G. (1998). *Educative Assessment. Designing Assessments To Inform and Improve Student Performance*. Jossey-Bass Publishers, 350 Sansome Street, San Francisco, CA 94104.

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25(1), 82-91.*