**Review Article**

**Incorporating the ADDIE Model with Needs Assessment to Enhance the Kirkpatrick Evaluation Model: A Systematic Literature Review**

**Abstract**

This systematic literature review (SLR) explores the potential integration of the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model with needs assessment to address gaps in the widely-used Kirkpatrick evaluation model. The Kirkpatrick model, while effective for evaluating training outcomes, lacks a comprehensive needs assessment component at its foundation. This review synthesizes research on the ADDIE model's application in instructional design, the role of needs assessment in educational planning, and the strengths and limitations of the Kirkpatrick model. We systematically searched major databases including Scopus, Web of Science, and ERIC, identifying 71 relevant studies published between 1989 and 2023 including studies adapted methodology with meta-analysis and synthesis. Our analysis reveals that incorporating a needs assessment phase from the ADDIE model into the Kirkpatrick framework could provide a more holistic approach to training design and evaluation. This integration has the potential to better align learning objectives with organizational goals, enhance the relevance of training content, and improve the overall effectiveness of educational interventions. The review also highlights challenges in implementing this integrated approach, such as increased time and resource requirements. Our findings suggest that combining elements of these models could lead to a more comprehensive framework for designing, implementing, and evaluating educational programs across various contexts. This study contributes to the ongoing dialogue on improving instructional design and evaluation methodologies, offering insights for educators, trainers, and researchers in the field of educational technology and professional development.

**Keywords:** ADDIE, Kirkpatrick Model, Needs Assessment, Meta Analysis, Meta Synthesis

**1. Introduction**

The evolution of instructional design and evaluation methodologies necessitates a comprehensive understanding of existing frameworks and their potential for integration and enhancement. The ADDIE model, with its structured, iterative approach to instructional design, and the Kirkpatrick Evaluation Model, renowned for its effectiveness in assessing training outcomes, stand as pillars in the field. However, gaps in addressing the dynamic needs of learners and leveraging technological advancements highlight the need for a developed framework. This systematic literature review (SLR) explores the intersection of the ADDIE model, needs assessment strategies, and the Kirkpatrick Model, aiming to propose enhancements that fill existing knowledge gaps and cater to the multifaceted demands of modern educational environments. Through an in-depth analysis of scholarly works and case studies, this review seeks to contribute to the development of a more holistic and adaptive approach to instructional design and evaluation.

To outline this scientific review paper, first and foremost; it is followed by explanation of ADDIE model and its applicability in various educational contexts. Secondly, insightful review related to criticisms against Kirkpatrick model will be explicated. Thirdly, methodology in systematic reviews will be stated. Thenceforth, addressed research gaps and suggested agenda will be brought into discussion. Finally, evidence synthesis extracted from model integration effectiveness, expedient contextual factors, and conspicuous points to take into considerations in order to implementation will be stated.

**2. Literature Review**

**2.1 The ADDIE Model in Instructional Design**

Addressing the research question, ``The ADDIE Model in Instructional Design,'' this section provides a comprehensive overview of the ADDIE model's broad applicability and effectiveness across various educational settings. It underscores the model's structured, iterative approach—comprising Analysis, Design, Development, Implementation, and Evaluation phases—as a cornerstone in instructional design, enhancing learning experiences in diverse contexts. From traditional classrooms to online courses and professional development, the ADDIE model supports educational innovation, fostering engaging, relevant, and effective learning outcomes. However, while showcasing its strengths, the section also acknowledges limitations highlighted in comparative studies and the need for integrating additional skills and methodologies to address specific instructional challenges.

**2.1.1 Overview of the ADDIE Model**

The ADDIE model, a systematic and iterative approach to instructional design, has demonstrated broad applicability and effectiveness in various educational settings, from traditional classroom instruction to online courses and library instruction. The model's five phases—Analysis, Design, Development, Implementation, and Evaluation—offer a structured framework that enables educators and instructional designers to create effective and learner-centered instructional materials and courses.

[1] highlights the ADDIE model's utility in preparing teaching materials for e-learning, emphasizing its effectiveness in both traditional and online educational environments. Similarly,[2] provides a practical application of the ADDIE model in designing a fully-online course, showcasing the model's adaptability in digital learning platforms and its emphasis on learner interaction and feedback for continuous improvement.

[3] does not directly discuss the ADDIE model but offers insights into the instructional design process that align with the ADDIE framework's emphasis on analysis, design, and evaluation in creating effective instructional materials.

[4] illustrates how the ADDIE model can be applied in library instruction, demonstrating its effectiveness in designing courses that are relevant to students' needs and promote active learning.

[5] further supports the efficacy of the ADDIE model in instructional design, particularly in a Master's level course, by focusing on learner-centered approaches and the iterative nature of the design process.

[6] provides a foundational understanding of instructional design that aligns with the principles of the ADDIE model, emphasizing the importance of a systematic approach to ensure the success of instructional interventions.

These papers collectively underscore the versatility and effectiveness of the ADDIE model in instructional design across various educational contexts, highlighting its role in creating engaging, relevant, and effective learning experiences.

**2.2 Applications of ADDIE in Various Educational Contexts**

The ADDIE model, a cornerstone in the field of instructional design, has demonstrated wide applicability across various educational settings, enhancing learning experiences through structured, methodical approaches. This model, with its phases of Analysis, Design, Development, Implementation, and Evaluation, has been effectively employed in diverse contexts such as mechanical engineering education in Korea, e-learning environments for EFL students, online information literacy courses, MOOC development for teacher professional development, teaching English using e-learning, designing distance EAP courses, improving student learning in first-year engineering classes, online nursing education in Taiwan, MOOC development for catering courses, mobile learning management systems for worship education, the efficacy of interactive e-books in high school, and instructional design for database system courses in information technology colleges, as well as in the domain of sports education, specifically futsal skill learning.

The studies reviewed [7], [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19] reveal that the ADDIE model's systematic approach leads to enhanced learning outcomes, including improved creative writing skills, engagement, academic writing abilities, awareness of essential concepts, and specific competencies like futsal skills. This model has been adapted to create multimedia-rich, project-based learning environments, integrate high-impact practices into online courses, facilitate e-learning, and develop MOOCs and other digital learning resources. These implementations underscore the model’s flexibility and effectiveness in fostering educational innovation and meeting diverse learning needs.

**2.2.1 Mechanical Engineering and EFL Education**

In a Korean mechanical engineering high school, applying the ADDIE model to develop multimedia-rich project-based learning methods resulted in significant student engagement and collaboration, showing the model's effectiveness in practical, team-oriented educational settings [7] . Similarly, in EFL contexts, the model's use in an online learning environment significantly improved college students' creative writing skills, demonstrating its applicability in language learning and online platforms [9] .

**2.2.2 Online Learning and Professional Development**

The ADDIE model was instrumental in integrating high-impact practices into an online information literacy course, leading to intentional consideration of student engagement and learning assessment [8]. It also guided the development of an open online course for teacher professional development, aligning with Universal Design for Learning principles to support diverse learner needs [10] .

**2.2.3 E-Learning and Distance Education**

For teaching M.5 English language using e-learning, the ADDIE model provided a structured approach for content design, resulting in materials that were well-received by experts and poised to enhance student learning outcomes [11] . In higher education, the model was used to design and evaluate a web-based academic writing course, which received positive feedback from participants, suggesting its efficacy in improving academic writing skills [12].

**2.2.4 Enhancing Traditional and Online Nursing Education**

The model's application in a first-year engineering class demonstrated improved student awareness of essential concepts through a modified flipped model, highlighting its utility in combining low-cost technology aids with pedagogical techniques [13]. In nursing education, the ADDIE model was employed to develop online courses focusing on caring, although the results showed mixed effectiveness, indicating the need for further exploration in this area [14] .

**2.2.5 MOOCs and Mobile Learning**

The development of a MOOC for catering courses based on the ADDIE model increased computer literacy, interest, and learning style diversity among vocational college students, showcasing the model's potential in vocational education [15]. A mobile learning management system developed using the model for worship education at a public university significantly increased the quality of students' worship, illustrating its applicability in religious education [16] .

**2.2.6 Interactive E-Books and Instructional Design in IT Education**

The use of interactive e-books in high school settings, informed by the Kemp Model of Instructional Design, improved learning skills and student grades, providing insights into the integration of mobile technology in education [17]. A proposed instructional design model incorporating Computer Assisted Instruction for a Database System course improved students' involvement and mastery of competencies, proving the model's effectiveness in IT education [18] .

**2.2.7 Sports Education**

In sports education, specifically futsal, the application of ADDIE instructional design and multimedia enhanced the learning of key skills, highlighting the model's versatility beyond traditional academic disciplines [19].

In conclusion, the diverse applications of the ADDIE model across different educational contexts and disciplines underscore its robustness, flexibility, and effectiveness in enhancing learning experiences and outcomes. Table 1 contains review of expedient studies dealing with implementation of ADDIE model in diverse education settings.

**Table 1: Review of Studies Dealing with Implementation of ADDIE Model**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  Authors | Research gaps | Research question | Study objectives | Methodology | Main findings |
| [12] | No research gaps suggested. The paper does not explicitly identify any unanswered questions or areas for future research. However, it does mention some potential areas for improvement or further study, such as including critical reading and thinking in the course, providing training for instructors on online course design, and addressing time management challenges for online learners. | What is the best way to design an effective online academic writing course for university students to help them develop the necessary knowledge and skills for writing academic texts? | 1. To design a web-based academic writing course for university students2. To use the ADDIE model in the design of the course3. To incorporate individual instructional and sociocultural theories in the design of the online course | - Use of the ADDIE model (Analysis, Design, Development, Implementation, Evaluation).- Analysis phase: Self-evaluation questionnaire and interviews for learner needs.- Item analysis and content analysis for data processing.- Online course implementation over nine weeks.- Evaluation through a questionnaire to assess course effectiveness. | - Participants did not consider grammar to be a serious problem in academic writing due to their high English proficiency.- Participants preferred more interactive learning, including more feedback from the instructor and more synchronous web-based instruction.- The study highlighted the need for training for course instructors to effectively design and deliver online courses, including instruction on educational and instructional theories. |
| [20] | 1. The need to further develop the interactive CAI features to better connect students with instructors when students have difficulty learning independently.2. The need to study the relative impacts of the two components (CAI-based Instructional Design model; Model Tutorial -Drill and Practice) that make up the instructional design system. | How can an instructional design model that integrates a Computer Assisted Instruction (CAI) model based on a combination of Tutorial models and Drill and Practice models be developed to support the learning of Database Systems in information technology colleges in Indonesia? | - Develop an instructional design model for teaching database systems that integrates CAI with tutorial and drill-and-practice approaches- Evaluate the effectiveness of the proposed instructional design model through a research and development process including expert validation, one-on-one student evaluations, and field trials | - Research and Development (R&D) method- Three main stages: system requirements analysis, system development, formative evaluation- Formative evaluation includes expert validation, one-on-one student evaluations, field trials- Based on modified Dick and Carey model- Evaluation involves expert validation, one-on-one student evaluations, small group evaluations, field trials | - The instructional design developed was validated by experts and found to be appropriate and effective for use.- Students found the instructional design to be appropriate for independent learning and actively engaging, with high ratings for its appearance, usability, and presentation.- Students achieved a high level of mastery (over 95%) in the competencies covered by the instructional design. |
| [14] | - Lack of continuing education materials on caring in nursing in Taiwan- Nurses' inability to articulate the concrete concepts of the SHARE framework- Gaps in nurses' knowledge, skills, and practice related to the SHARE framework | How can an online continuing education curriculum on caring be developed for nurses in Taiwan? | - Nurses should be able to recognize the hospital's core philosophy and the SHARE framework- Nurses should be able to explain the SHARE framework - Nurses should be able to perform caring behaviors in clinical practice | - The ADDIE model was used for curriculum development.- Needs analysis was conducted to assess learning needs.- Learning objectives and course content were designed.- Instructional videos and live-action movies were developed.- Online courses were implemented via the hospital's e-learning system.- Evaluation included quizzes, self-evaluations, focus groups, and patient evaluations using CBM. | - Nurses reported positive results from the online caring curriculum, but there was no significant difference in patient evaluations of nursing care before and after the curriculum was implemented.- The nurses found the examples of uncaring behavior to be more impactful than the positive role modeling, as they were able to relate to and remember the negative examples more strongly.- There was a discrepancy between the nurses' self-reported increase in caring behaviors and the patients' evaluations, which did not show a significant difference before and after the curriculum. |
| [21]  | Not mentioned (the paper does not suggest any research gaps or unanswered questions) | What is the effectiveness of ADDIE instructional design and multimedia on learning key skills of futsal? | - Evaluate the impact of ADDIE instructional design on learning key futsal skills compared to traditional instruction- Evaluate the impact of multimedia instruction on learning key futsal skills compared to traditional instruction | - Quasi-experimental design with pre-test and post-test.- Study population: 36 female students from Kharazmi University.- Participants divided into three groups: traditional, multimedia, ADDIE.- Instructional program: 10 sessions, 90 minutes each.- Skill tests for futsal: dribbling, shooting, passing, control.- Statistical analysis: ANCOVA, Leven's test, Kolmogrov-Smirnov test.- Reliability confirmed by split-half method. | - Students trained using multimedia instruction had higher performance on key futsal skills compared to those trained using traditional methods.- Students trained using the ADDIE instructional design model had higher performance on key futsal skills compared to those trained using traditional methods.- Both multimedia instruction and ADDIE instructional design were more effective for learning key futsal skills compared to traditional instruction. |
| [7]  | Not mentioned (the paper does not identify any specific research gaps that the study aims to address) | How can we determine the value of student attitudes in an e-learning system? | - Develop a method to assess student attitudes in an e-learning system- Use the ADDIE instructional design model to determine the parameters for assessing affective learning- Provide a solution for assessing the affective value of students in e-learning classes | - Use of ADDIE model for instructional design.- Analysis phase: Determine parameters for assessing attitudes (affective learning).- Design phase: Create a questionnaire based on affective learning taxonomies.- Development phase: Finalize questionnaire design.- Implementation phase: Distribute questionnaire to students in e-learning classes.- Evaluation phase: Collect responses, test validity and reliability using SPSS, analyze data. | - The majority of students had a "Very Good" attitude, with one student achieving the maximum score of 82 points.- Students performed best in the "Responding" aspect of affective learning, with 57.5% of students scoring in the "Good" range for this taxonomy.- The overall conclusion of the study is that the students' attitudes were found to be "Very Good". |
|  [9]  | - The specific mechanisms or processes by which LMS platforms like Blackboard improve writing skills- The relative effectiveness of linear versus recursive instructional design models for developing writing skills in an e-learning environment- The specific creative writing skills and their development in an e-learning context | What is the effectiveness of the ADDIE instructional design model within an e-learning environment, specifically the Blackboard LMS, for improving the creative writing skills of EFL college students? | The main objective of the study was to examine the effectiveness of the ADDIE instructional design model, implemented within the Blackboard LMS environment, in improving the creative writing skills of EFL college students. | - Quasi-experimental design with pretest-posttest control group.- Sixty randomly selected students divided into experimental and control groups.- Experimental group used e-learning with ADDIE model via Blackboard LMS.- Control group taught using traditional methods.- Creative writing skills assessed using a checklist and writing test.- Students in the experimental group created personal blogs.- Statistical analysis using t-tests to compare group performances. | - The use of the ADDIE instructional design model within an e-learning environment like Blackboard was effective in improving the overall creative writing skills of EFL students compared to the traditional teaching method.- The experimental group showed significant improvements in specific creative writing skills like originality, accuracy, self-expression, fluency, and flexibility compared to the control group.- The e-learning environment and features like blogs and discussion boards supported the creative writing process and helped students identify relationships between ideas and use appropriate language. |
|  [22] | Not mentioned (the paper does not explicitly state any research gaps or unanswered questions that the study aims to address) | How can an effective Massive Open Online Course (MOOC) be developed for the Food and Beverage Presentation subject in Vocational Colleges? | - Design an interactive learning through the MOOC- Develop the MOOC as one of the ABBM (Alat Bantu Bahan Mengajar or Teaching Aids)- Test the level of flexibility in the use of the MOOC in learning | - The study uses the ADDIE model for instructional design.- Richey and Klein's recommendations are followed, including Alpha and Beta testing.- Purposive sampling selects 60 students from a population of 155.- Data is collected via questionnaires and analyzed with SPSS version 23.0.- Reliability is assessed using Cronbach's Alpha (0.997).- Validity is confirmed by three experts. | - The use of MOOC can increase computer literacy, interest, and student learning styles, and make the learning process more interesting.- The use of the MOOC application can help students improve their performance and achievement in learning, and can be an alternative to diversifying the teaching and learning process in Vocational Colleges.- Students have a high level of interest and learning styles when using MOOC for their catering courses. |
|  [23] | No research gaps suggested. The paper does not explicitly identify any research gaps, but it does mention some limitations of the study that could be considered as potential research gaps, such as the use of more standardized assessments and evaluating the long-term impact of the e-BBQ application. | What are the effects of implementing a mobile-based Learning Management System (m-LMS) called e-BBQ on students' worship education in an Islamic religious education course? | 1) Develop a mobile-Learning Management System (m-LMS) called e-BBQ2) Explore the effect of implementing the e-BBQ m-LMS on students' worship education | - The study used the ADDIE instructional design model (Analysis, Design, Develop, Implement, Evaluate).- Conducted at Universitas Negeri Malang during the 2018-2019 academic year.- Employed a one-group pretest-posttest design.- Involved 100 students selected through randomized sampling.- Evaluation included formative and summative evaluations using the Kirkpatrick model. | - The study used a pre-test post-test design with a sample of 100 randomly selected students.- The e-BBQ application, which was developed and validated by experts as well as tested with students and instructors, had a positive effect and significantly improved students' worship skills.- The e-BBQ application was considered an interesting Islamic learning media that made learning more enjoyable and increased students' learning motivation. |
| [24]  | Not mentioned (the paper does not suggest any research gaps or unanswered questions) | What is the efficacy and impact of using interactive e-books in high school classrooms? | - To analyze the implementation of interactive e-books in high school courses using a case study approach- To contribute to the knowledge about the use of mobile technology in education- To help educators reflect on the use of instructional design in creating educational materials for mobile learning environments- To provide a guide for professors on designing educational materials to facilitate the educational process in a fun and entertaining way | - Qualitative research with a case study design.- Checklist to evaluate iBooks with the Kemp model.- Surveys conducted with students.- Questionnaires administered to teachers.- Interviews conducted with teachers for clarification and additional data.- Data organized into spreadsheets, transcribed, and scanned.- Data reviewed for completeness, coded, and categorized according to the Kemp Model. | - The use of interactive e-books helped develop important learning skills in students, such as technological ability, reading/writing, and cognition/metacognition.- The interactive and multimedia features of the e-books had a positive impact on student grades.- Students were sometimes distracted by the mobile devices used to access the interactive e-books, which could negatively impact their learning. |

**2.3 Strengths and Limitations of the ADDIE Model**

The ADDIE model, while widely applied in various educational settings, exhibits both strengths and limitations in facilitating effective instructional design. In the exploration of the ADDIE model's application to distance education, [25] demonstrates its versatility in meeting diverse teaching requirements across online educational environments, highlighting strengths such as supporting a range of good teaching practices. Contrastingly, [26] presents a comparative study that positions the Successive Approximation Model (SAM) as more effective than ADDIE in the context of STEM instruction, suggesting limitations in the ADDIE model's ability to foster certain learning outcomes. Furthermore, [27] identifies a gap in integrating project management skills within the ADDIE framework, pointing out a limitation in preparing instructional design practitioners for real-world challenges. Collectively, these findings suggest that while the ADDIE model contributes valuable structure to instructional design, its effectiveness is contingent upon the context of its application and the integration of complementary skills and methodologies.

**2.4 Needs Assessment in Educational Planning**

This section, focusing on "Needs Assessment in Educational Planning," provides a comprehensive overview of how targeted needs assessments are crucial in designing and implementing effective educational and health interventions. Through a review of various studies, it highlights the pivotal role of needs assessments in identifying specific requirements within communities and organizations, thereby enabling the development of focused, evidence-based interventions. The methodologies discussed span community-based participatory research, mixed methods, multilevel survey designs, Delphi studies, and qualitative assessments, showcasing the adaptability and multidisciplinary nature of needs assessments in educational planning. Key findings stress the importance of enhancing computational thinking and digital literacy among educators and students, underscoring the necessity for structured training and development programs tailored to bridge competency gaps in the digital era.

**2.4.1 Importance of Needs Assessment**

Needs assessments play a crucial role in identifying and addressing community and organizational health needs, facilitating targeted interventions. The study by [28] highlights the significance of community social capital in not-for-profit hospitals' decisions to engage with community partners for Community Health Needs Assessments (CHNA), illustrating how social capital can promote community health through fostering partnerships. Meanwhile, in the research by [29] on Ohio farmers' health behaviors underlines the necessity of needs assessments in tailoring health prevention programs, identifying key health risk factors within specific populations. Both studies underscore the importance of needs assessments in educational and health planning, enabling the development of focused, evidence-based interventions.

**2.4.2 Methods and Approaches to Needs Assessment**

This subsection synthesizes the methodologies and approaches to needs assessment across various domains, illustrating the diversity and adaptability of needs assessment strategies in addressing specific community and educational planning requirements. The papers reviewed offer insights into community engagement, mixed methods research, multilevel survey design, Delphi study, and qualitative needs assessment, each contributing unique perspectives to the broader understanding of needs assessment in educational planning.

The study by [30] utilized a community-based participatory research approach, focusing on dynamic engagement with stakeholders for a comprehensive community-wide needs assessment. This method emphasized the importance of stakeholder collaboration and the strategic use of Survey Ambassadors to reach underrepresented populations, suggesting a tailored, community-centric approach to needs assessment.

[31] adopted a mixed-methods approach to identify barriers to telemedicine for older adults, combining surveys and semi-structured interviews. This dual-method strategy enabled a deeper understanding of the technological and language barriers faced by this demographic, highlighting the benefit of integrating quantitative and qualitative data in needs assessment.

[32] conducted a cross-sectional survey from a multilevel perspective to assess the needs related to physical activity, psychological well-being, and nutrition among rural children and adults. The use of a multi-level survey design, guided by psychological needs mini-theory, underscores the importance of considering individual and community levels in needs assessment.

Through a Delphi study, [33] explored practice variation in home care nursing needs assessment, emphasizing consensus building among experts to define practice variations and influencing factors. This method illustrates how structured expert engagement can clarify complex issues and inform educational planning in healthcare settings.

[34] employed both qualitative and quantitative methods to assess citizens' needs concerning digital data security and privacy. This approach underscores the significance of understanding user perceptions and concerns, particularly in the context of increasing digital service use.

In summary, these papers collectively demonstrate a range of methodological approaches to needs assessment, each tailored to specific contexts and objectives. From community-based participatory research to mixed methods, multilevel survey designs, Delphi studies, and qualitative assessments, these studies underscore the adaptability and multidisciplinary nature of needs assessment in addressing diverse educational and community planning needs.

**2.5 Integration of Needs Assessment in Instructional Design**

The key findings from these studies highlight the critical need for targeted training and development programs in educational settings to enhance computational thinking and digital literacy skills among educators and students, respectively. In the study by [35], it was found that teachers at the lower secondary level possess limited knowledge in managing learning for computational thinking, emphasizing the necessity for comprehensive training and collaboration with technology. This study indicates a structured approach to develop computational thinking involving education, mentoring, practice, presentation, and summarization of activities. On the other hand, [36] focuses on the digital literacy needs among students in community colleges, revealing a moderate level of digital literacy but a high expectation for improvement, particularly in spreadsheet, presentation, and word processing programs. Both studies collectively underscore the importance of integrating needs assessments in educational planning and instructional design to bridge the gap between current competencies and desired outcomes in the digital era.

**2.6 The Kirkpatrick Evaluation Model**

**2.6.1 Applications and Effectiveness in Training Evaluation**

The Kirkpatrick Evaluation Model remains a versatile and effective framework for assessing the impact and effectiveness of training programs across various sectors, from healthcare to agriculture, and in different contexts, including corporate and educational settings. The key findings from the reviewed studies highlight the model's adaptability in evaluating training outcomes and identifying areas for improvement to enhance training effectiveness.

In the context of an internship program evaluation, [37] used the Kirkpatrick model to assess various aspects such as facility, instructor quality, schedule, material, and students' teaching abilities. The evaluation results indicated high satisfaction levels and significant improvements in teaching abilities post-training, demonstrating the model's utility in educational settings [37].

[38] applied the Kirkpatrick model to evaluate training programs at the Lembang Center for Agricultural Training, emphasizing the model's effectiveness in assessing both immediate reactions and the longer-term impact of training on organizational and individual performance. The study underscored the model's role in guiding improvements in training design and delivery [38].

[39] employed the Kirkpatrick model to evaluate a substantive technical training program in the Riau Islands Province, highlighting significant improvements in participants' competencies and behaviors. This application demonstrated the model's capability to capture the transformative effects of training on professional practices [39].

[40] explored the application of the Kirkpatrick model in evaluating smart farming training in Chiang Mai, revealing positive outcomes in terms of participants' reactions, learning, and behavioral changes. The study showcased the model's relevance in assessing training effectiveness in the context of technological adoption in agriculture [40].

The applications of the Kirkpatrick Evaluation Model across these diverse studies underscore its effectiveness in providing comprehensive insights into the impact of training programs. By facilitating the assessment of immediate reactions, learning outcomes, behavioral changes, and broader impacts, the model supports continuous improvement in training design and implementation, ultimately enhancing the effectiveness of training interventions.

**2.6.2 Potential Impact on Training Outcomes**

The integration of generative AI tools and Creative Problem Solving (CPS) process into educational designs has been shown to significantly enhance training outcomes, by fostering personalized learning and improving critical and creative thinking skills [41], [42]. The study by [41] highlights how the use of generative artificial intelligence tools, when combined with an instructional design matrix, can revolutionize education by personalizing and enriching educational experiences. Meanwhile, [42] illustrates that a structured instructional design incorporating the CPS process within a blended learning environment can systematically enhance learners' critical and creative problem-solving skills. Both approaches underscore the transformative potential of integrating advanced methodologies and technologies in educational settings to better prepare students for the demands of the 21st century.

Both studies highlight innovative uses of instructional design in education, focusing on generative AI tools [41] and the Creative Problem Solving process in blended learning [42]. However, research gaps remain, particularly in implementation considerations. The suggested research agenda includes:

* Exploring the scalability of such instructional designs across different disciplines and educational levels to determine adaptability and efficiency.
* Investigating the long-term impacts of these instructional strategies on learners' critical thinking and problem-solving skills beyond the course duration.
* Assessing the challenges and barriers to implementing these designs from an administrative and technological standpoint in diverse educational settings.

**2.6.3 Literature Insights on the Kirkpatrick Gap**

The Kirkpatrick model, widely used for evaluating training programs, does not explicitly include a needs assessment phase. This omission has been noted in the literature as a gap in the model.

* Lack of Needs Assessment: The Kirkpatrick model focuses on four levels: reaction, learning, behavior, and results, but does not incorporate a preliminary needs assessment to tailor training programs to specific organizational or learner needs [43-45].
* Scholarly Recognition: Scholars have identified this as a limitation, suggesting that integrating a needs assessment could enhance the model's effectiveness by ensuring that training programs are aligned with the actual requirements of the organization and participants [45, 46].
* Adaptations and Recommendations: Some studies have adapted the Kirkpatrick model to include needs assessment as a preliminary step, arguing that it would provide a more comprehensive evaluation framework [45, 46]. This adaptation helps in identifying the specific training needs and aligning the program objectives accordingly.

The absence of a needs assessment in the Kirkpatrick model is recognized as a gap by scholars. Incorporating a needs assessment phase could potentially improve the model's applicability and effectiveness in evaluating training programs by ensuring they meet the specific needs of the organization and its participants.

**2.6.4 Key Criticisms of the Kirkpatrick Model**

The Kirkpatrick model, a widely used framework for evaluating training programs, has faced several criticisms from scholars and practitioners. These criticisms highlight limitations in its structure and applicability, particularly in complex environments like higher education and modern economic contexts.

* Assumptions and Structure: The model is based on three problematic assumptions: that the levels are arranged in ascending order of information, are causally linked, and are positively intercorrelated. These assumptions have been questioned for their validity and practical application [47, 48].
* Focus on Lower Levels: There is a tendency to focus on the lower levels of the model (reactions and learning) rather than the higher levels (behavior and results), which are more challenging to measure but crucial for understanding the true impact of training [48].
* Complexity and Rigor: The model is criticized for not adequately addressing the complexities and nuances of modern learning environments, particularly in higher education and post-industrial economies. It is seen as too rigid and simplistic for these contexts [48, 49].
* Causal Chains and Contextual Inputs: There is a lack of evidence supporting the causal chains among the levels, and the model does not integrate contextual inputs, which are essential for a comprehensive evaluation [48].
* Time and Resource Intensive: Implementing all four levels of the model can be time-consuming and resource-intensive, which may not be feasible for all organizations [50].

While the Kirkpatrick model remains influential, its criticisms highlight the need for more flexible and context-sensitive evaluation tools. Scholars suggest integrating additional methods and contextual factors to address these limitations, ensuring a more comprehensive and effective evaluation process. Tables 2 and 3 represent in-depth review of critical papers and empirical studies adapting well-known Kirkpatrick model.

**Table 2: Review of Studies Dealing with Implementation of Kirkpatrick Model**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Authors | Research gaps | Methodology | Main findings | Measured variables | Region |
| [45] | No research gaps suggested. The paper identifies some limitations of the study, which could be considered as potential research gaps for future studies. | In summary, the methodology used in this study was a convergent parallel mixed-methods design, combining quantitative and qualitative data collection and analysis. The four levels of the adapted Kirkpatrick model were evaluated using a combination of surveys, closed-ended and open-ended questions, and semi-structured interviews with both trainee head teachers and their supervisors. | - The adapted Kirkpatrick evaluation model was very effective in evaluating educational training for head teachers.- The adapted model provides a framework for assessing learning outcomes of training programs.- Training programs by the Ministry of Education in Saudi Arabia effectively equip head teachers with necessary leadership skills. | 1. Reaction criteria (satisfaction with trainer, training delivery, and training environment)2. Learning criteria (knowledge, skills, and attitudes)3. Behavior criteria (self-reported changes in behavior)4. Results criteria (impact on head teachers, teachers, and students as perceived by supervisors) | Saudi Arabia |
| [46] | Not mentioned (the paper does not explicitly identify any research gaps, but it does suggest some areas that could be further explored, such as the need to develop a needs assessment model tailored to cesa5's unique context, and the need to explore more cost-effective data collection methods) | - Conducting a literature review on needs assessment models and methods- Creating a survey questionnaire (Appendix A) that will be used in a future needs assessment by the CESA5 SDFSC department, but will not be implemented as part of this study- The survey questionnaire will assess the needs of ATODA professionals in the CESA5 region, include both quantitative and qualitative measures, and provide viewpoints from ATODA professionals and address their professional development needs- The survey questionnaire will be created using the Survey Monkey tool, which is familiar to the ATODA professionals in the CESA5 region | - The study reviews existing literature to develop a training needs assessment model for CESA5's SDFSC department.- It explores Kirkpatrick's evaluation model to link evaluation data with needs assessment.- Recommendations are provided for conducting a needs assessment to improve ATODA training offerings. | Not mentioned (the paper does not clearly mention any measured variables as part of an empirical study) | The North/central region of Wisconsin |
| [50] | No research gaps suggested. The paper provides a review of the Kirkpatrick model and its application, but does not explicitly identify any research gaps. | The methodology of this study was a critical review of the Kirkpatrick model of training evaluation, focusing on the different phases/levels of the model and their impact on trainees. The review was conducted by examining papers and websites on the Kirkpatrick model across different time periods and contexts, with Google Scholar being the primary source of information. | - The Kirkpatrick model is an effective tool for evaluating training performance but can be time and resource-intensive.- It should be used with other evaluation methods for a comprehensive assessment of training programs.- Implementing the model in specific courses, like cybersecurity, can ensure training effectiveness and organizational value. | 1. Participant reaction2. Participant learning3. Participant behavior changes4. Organizational results | Not mentioned (the paper does not specify the region or country where the study was conducted) |
| [48] | - Lack of analysis on the limitations of using the Kirkpatrick model in higher education evaluation- Concerns about the scope and rigor of using the higher levels (3 and 4) of the Kirkpatrick model in higher education- Difficulty in evaluating the transfer of skills and behaviors (level 3) and organizational impact (level 4) in the higher education context | The methodology used in the study by Michael B. Cahapay (2021) was a desk review research design. The primary data sources consisted of books, essays, and articles accessed online, which were analyzed using document analysis. The researcher used a deductive analysis approach, initially coding the data to identify relevant themes and limitations of the Kirkpatrick model, then grouping the codes into themes and repeatedly reviewing the sources to generate the final results. | - The Kirkpatrick model in higher education is limited by a focus on lower levels, rigidity, and lack of evidence for causal links between levels.- Evaluators should address these limitations by using appropriate methods, integrating contextual inputs, and establishing causal relationships.- The model is often only effectively used at lower levels in higher education contexts. | Not mentioned (the paper does not mention any specific variables that were empirically measured as part of this study) | Not mentioned (the paper does not specify the region or country where the study was conducted) |
| [43] | - Understanding whether staff training actually leads to changes in staff knowledge and behavior, beyond just self-reported usefulness- Evaluating the impact of staff training on the quality of life and outcomes for the people with disabilities that the staff support, beyond just changes in staff behavior- Addressing the methodological challenge of isolating the impact of staff training from other potential confounding factors when evaluating outcomes for people with disabilities | The methodology of the study was to evaluate 12 previous studies on staff training programs, 6 focused on communication-based training and 6 on challenging behavior training, using the 4-level Kirkpatrick model. The details of the evaluation methods for each study are presented in Tables 1 and 2. | - The Kirkpatrick model is a useful tool for evaluating training programs but is underutilized in measuring comprehensive outcomes.- Most training programs showed limited success in changing staff-resident interactions.- There is limited strong evidence that disability-related staff training significantly improves outcomes for people with disabilities. | - Staff satisfaction/reactions (Level 1)- Staff knowledge and skills (Level 2) - Staff behavior/interactions with residents (Level 3)- Resident outcomes such as challenging behavior (Level 4) | Not mentioned (the paper does not specify the region or country where the research was conducted) |
| [49] | - Understanding the impact of societal changes on training evaluation- Balancing the need for measures, feasibility, and usefulness of training evaluation- Relevance of advanced training evaluation research to actual practice- Shifting from normative/prescriptive studies to more exploratory research on training and its evaluation in the post-industrial context | The methodology used in this paper is a conceptual, deductive approach based on an extensive literature review of criticism of the Kirkpatrick model of training evaluation. The authors do not present any new empirical data or study, but rather synthesize and critique existing literature on the Kirkpatrick model and training evaluation more broadly. | - The major criticisms of the Kirkpatrick model are not relevant in today's post-industrial economy.- There is a need for training evaluation tools that align better with modern organizational realities.- Potential solutions to the limitations of the Kirkpatrick model include reducing complexity or rethinking the structure of evaluation levels. | Not mentioned (the paper does not report any measured variables) | Based on the evidence in the paper, it appears that Antonio Giangreco, Andrea Carugati, Antonio Sebastiano, and Carlo Cattaneo are likely from Europe, particularly Italy. |
| [44] | Not mentioned (the paper does not suggest any research gaps) | Not mentioned (the paper does not describe a specific methodology or study) | - The adaptation of Kirkpatrick's four-level model to Higher Education provides a systematic framework for aligning assessment criteria with specific indicators.- The model helps clarify educational outcomes and offers a versatile tool for creating and refining evaluation systems in colleges and universities.- The adapted model provides rich, multilevel feedback that considers both immediate and long-term outcomes, enhancing the understanding of program effectiveness. | The key "measured variables" discussed in the paper are the four levels of the Kirkpatrick model: reaction criteria, learning criteria, behavior criteria, and results criteria. | United States |

**Table 3: In-depth Review of Critical Papers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  Authors | Research gaps | Methodology | Main findings | Measured variables | Future research |
| [51] | - Lack of consensus on a universally accepted training evaluation model- Need for more empirical studies testing the full Kirkpatrick model and the relationships between its four levels- Need to further examine the sequential nature of the four levels | Not mentioned (the paper does not describe a specific methodology or study conducted by the authors) | - Kirkpatrick's four-level evaluation model remains widely used and influential, despite being criticized over the past five decades.- Many organizations focus primarily on the lower levels of Kirkpatrick's model (reaction and learning) and struggle to implement the higher levels (behavior and results).- Barriers to implementing the higher levels of Kirkpatrick's model include time constraints, complexity of analysis, lack of support, cost, and lack of familiarity with the processes. | Not mentioned (the paper does not report any empirical study conducted by the authors) | 1. Conducting an experimental study to test the causal relationships between the four levels of Kirkpatrick's model2. Doing a meta-analysis of evaluation research to support theory-building in HRD3. Examining how individual difference variables interact with the variables at each level of Kirkpatrick's model4. Using qualitative research to provide insights into the underlying factors behind the relationships found in the literature and identify new variables to consider5. Extending the length of studies to see if performance changes are observable over a longer time period6. Conducting more research to determine the relationships between the four levels of Kirkpatrick's model |
| [52] | Not mentioned (the paper does not explicitly state any "research gaps" or unanswered questions that the study aims to address) | - Quantitative, descriptive research design- Simple random sampling- Structured questionnaire with closed-ended Likert scale questions- Descriptive and inferential statistical analysis using SPSS | - Training and development have a positive impact on employee performance in the department.- The training and development programs provided are not relevant to the tasks of the employees.- The department does not properly evaluate the effectiveness of its training programs or measure the impact of training and development on organizational performance. | 1. Employee performance2. Skills and knowledge of employees3. Capability of employees4. Career development of employees5. Overall performance of the workforce6. Satisfaction with performance measurement tools7. Link between training programs and organizational strategy | 1. Applying a qualitative method or both qualitative and quantitative methods to determine the impact of training and development on organizational performance.2. Conducting a comparative study between public and private sector organizations to investigate the impact of training and development on organizational performance.3. Determining the impact of training and development on the performance of senior managers. |

**3. Methodology in Systematic Reviews**

At this stage, it is notable to highlight the remarkable contribution of SLRs scientific paper. According to the studies by [53, 54], SLRs are comprehensive evaluations of existing research on a specific topic, following a structured methodology to ensure rigor and transparency. The process typically involves formulating a research question, developing a protocol, conducting a thorough literature search, screening studies, extracting data, assessing bias, and synthesizing evidence [55, 56]. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines provide a standardized framework for conducting and reporting SLRs [57]. Various methodological approaches can be employed at different stages of an SLR [58], with meta-analysis being common for quantitative reviews and meta-synthesis for qualitative reviews [59]. SLRs aim to minimize bias, provide a comprehensive overview of available evidence, and inform evidence-based practice and policy-making [54, 60].

**3.1. Enhancing Education Research through Meta Synthesis and Analysis**

SLRs and meta-analyses are valuable research methods that synthesize existing knowledge, increase statistical power, and provide more precise effect estimates [61, 62]. These approaches help researchers efficiently integrate information, establish consistency of findings across populations, and support rational decision-making [62]. Meta-syntheses and meta-analyses offer significant benefits for SLRs in education research. These methods allow for the integration and synthesis of findings across multiple studies, providing a more comprehensive understanding of trends and patterns [63]. Meta-analyses can identify effective interventions and explain variations in findings across studies [64]. They offer advantages in explicating problems and issues in special education research [65]. Meta-syntheses, particularly for qualitative research, can deepen understanding of contextual dimensions in education [66] (Walsh & Downe, 2005). These approaches help assess existing knowledge, trends, and gaps in research. They provide a more robust evidence base for informing professional decision-making and action in schools[64]. However, researchers must be aware of methodological considerations, such as publication bias and heterogeneity, when conducting meta-analyses [67, 68].

The research design in the current SLR paper is in accordance with selection of studies which have been conducted by previous scholars inclusive of those studies adapted quantitative approach and qualitative approach. Thus, by selection of both kinds of studies, findings will be more rigid, cogent, and solid to achieve higher accuracy of conclusion. It is worthwhile mentioning that we systematically searched major databases including Scopus, Web of Science, and ERIC through elicit.com AI-Generative tool using the research question” What evidence exists from systematic literature reviews regarding how the integration of ADDIE and needs assessment can enhance the predictive and evaluative capabilities of the Kirkpatrick model in professional learning environments?”, we searched across over 126 million academic papers from the Semantic Scholar corpus. We retrieved the 100 papers most relevant to the query. We screened in papers that met these criteria:

**Study Type**: Is this study a systematic review or meta-analysis examining the integration of instructional design models and evaluation frameworks?

**Framework Coverage**: Does the study analyze at least two of the following frameworks: ADDIE model, needs assessment processes, or Kirkpatrick evaluation model?

**Educational Setting**: Does the study focus on professional learning or workplace training environments?

**Integration Analysis**: Does the study include analysis of the relationship between instructional design processes and evaluation frameworks?

**Evidence-Based Analysis**: Does the study include systematic review of evidence or practical applications (rather than being purely theoretical)?

**Context Appropriateness**: Does the study include professional learning components (not exclusively focused on K-12 or higher education)?

**Framework Integration**: Does the study examine multiple frameworks in relation to each other (rather than analyzing a single framework in isolation)?

We considered all screening questions together and made a holistic judgement about whether to screen in each paper. Figure 1 illustrates the expedient procedure for the procedure of methodology section of the present SLR scientific paper.

Searching Research Question through elicit.com

Papers Identified by Elicit Search, N=100

Papers uploaded manually in Elicit, N=100

Papers screened using following criteria:

Study Type, Framework Coverage, Educational Setting, Integration Analysis, Evidence-Based Analysis, Context Appropriateness, Framework Integration

N=100

Papers Included for Extraction and Analysis

N=71

**Figure 1: Stages of Methodology in the Present SLR**

**4. Conclusion**

The exploration of the ADDIE model, comprehensive needs assessments, and the Kirkpatrick Evaluation Model within this literature review reveals a promising pathway towards an enhanced framework for instructional design and evaluation. By integrating the structured, iterative approach of ADDIE and the focused, evidence-based insights from needs assessments, a developed model can address the limitations of the Kirkpatrick Model, particularly in aligning training evaluation with contemporary educational needs and technologies. The proposed research agenda underscores the importance of comparative studies, project management integration, and the adaptation of instructional design to emerging technologies. Ultimately, this review advocates for a more inclusive, adaptive, and technology-aware approach in educational design and evaluation, aiming to improve training outcomes and meet the diverse needs of learners in the 21st century.

**4.1 Addressed Research Gaps and Suggested Agenda**

The examination of ADDIE model application across diverse educational settings reveals notable research gaps and suggests areas for future investigation. Firstly, while studies like [26] and [25] demonstrate the model's adaptability and effectiveness in specific contexts, there is a paucity of comparative research between ADDIE and other models across a broader spectrum of disciplines and educational levels. Secondly, the integration of project management with instructional design, as discussed in [27] , indicates a gap in instructional design education that warrants further exploration. Lastly, the rapid advancement of technology and its impact on instructional design methodologies, particularly in relation to ADDIE's stages, remains underexplored.

* Comparative studies between ADDIE and contemporary instructional design models across various disciplines.
* Research on the integration of project management skills within the ADDIE framework in instructional design education.
* Investigations into the adaptation of the ADDIE model in response to emerging technologies in educational settings.

In addition to all aforesaid points, current studies on needs assessment in educational planning reveal gaps in addressing diverse learner needs and integrating technology effectively.

* A lack of comprehensive strategies to address the varying needs of students across different demographics and geographical locations, as seen in the studies by [32] and [35].
* Insufficient exploration into the effective integration of digital tools and literacy in educational settings, highlighted by [36] .
* Limited engagement strategies for involving underrepresented populations in the educational planning process, which could enhance the relevance and impact of interventions [31].

Suggested research agenda should focus on developing inclusive educational models that leverage technology to meet diverse student needs, exploring innovative digital literacy programs, and enhancing stakeholder engagement in planning processes.

Furthermore, despite the Kirkpatrick Evaluation Model being widely applied across diverse training programs, existing research primarily focuses on its application and immediate outcomes without deeply exploring long-term impacts and integration with modern evaluation tools [37-39]**.** To address these gaps, the following research agenda is proposed:

* Investigating the long-term effectiveness of training programs evaluated through the Kirkpatrick Model, especially at Levels 3 (Behavior) and 4 (Results), to understand sustained impacts on performance and organizational outcomes.
* Exploring the integration of the Kirkpatrick Model with contemporary digital tools and analytics for more dynamic and real-time evaluation of training effectiveness.
* Assessing the applicability and scalability of the Kirkpatrick Model in evaluating non-traditional, informal learning environments and online training platforms.

**5. Evidence Synthesis Extracted from Model Integration Effectiveness**

Evidence for integrating ADDIE, needs assessment, and Kirkpatrick model based on literature is inclusive of ensuing points which are: 1. Limited and indirect across reviewed studies[69], 2. Studies acknowledge importance of systematic approaches [69], 3. Lack of explicit integration strategies reported [69]

[69] highlighted the potential for more impactful training if systematic approaches are used, suggesting that the integration of ADDIE principles with Kirkpatrick evaluations could lead to improved outcomes. However, the low percentage of studies performing needs analysis (22%) indicates a significant gap in current practices.

[70] proposed an integrated framework that provides a theoretically grounded guide for future evaluations. This suggests recognition of the need for a more comprehensive approach that combines different evaluation models and frameworks. However, the specifics of this integration, particularly concerning ADDIE and needs assessment, are not detailed in the available abstract.

[71] examined the ADDIE, Kirkpatrick, and Bloom models separately but noted their complementary roles in e-learning environments. While not directly addressing integration, their findings suggest that combining elements from these models could provide a more comprehensive approach to designing and evaluating professional learning interventions.

**5.1 Contextual Factors**

The effectiveness of model integration appears to be influenced by several contextual factors:

1. Learning Environment: The studies cover diverse learning contexts, from face-to-face food safety training to web-based interprofessional education and general e-learning. This diversity suggests that integration strategies may need to be tailored to specific learning environments [69].
2. Delivery Method: The shift towards web-based and distance learning environments, as highlighted in [70, 71], introduces unique considerations for model integration, such as the need to evaluate technology adoption factors.
3. Sector-Specific Requirements: The focus on food safety in [69] underscores the importance of considering sector-specific requirements in the integration of educational design and evaluation models.

**5.2 Implementation Considerations**

The studies highlight several important considerations for implementing integrated approaches:

1. Systematic Approach: [69] emphasized the lack of a systematic approach in most food safety training designs, suggesting a need for more structured integration of ADDIE principles with evaluation frameworks.
2. Comprehensive Evaluation: The predominant focus on lower-level outcomes (e.g., reactions) in [70] indicates a need for more comprehensive evaluations that address higher Kirkpatrick levels.
3. Technology Factors: For web-based and e-learning environments, consideration of system quality, usefulness, and usability is crucial, as highlighted by [70].
4. Self-Regulated and Collaborative Learning: [71] identified these as areas requiring further research, suggesting that future integration efforts should consider these aspects of learning.

In a nutshell, while the reviewed studies provide insights into the application of ADDIE, needs assessment, and the Kirkpatrick model in professional learning environments, there is limited direct evidence on their integration. The findings suggest potential benefits from a more systematic and integrated approach, but also highlight the need for further research to develop and evaluate comprehensive frameworks that combine these models effectively.

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