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| **Title** | **Authors (Institution)** | **Year** | **Objective / Scope** | **Methodology / Tech** | **Key Findings / Contributions** | **Relevance to IntelliQuiz** | **Source (Link)** |
| **Intelligent Integrated Knowledge Discovery Platform: Advancements in Question Generation and Adaptive Learning** | Chaudhary, M.; Mahajan, A.; Sharma, S.; Kumar, S. (Sharda Univ., India) | 2025 | Presents an AI-based platform using NLP (BERT) and LLMs to automatically generate questions from uploaded study material and enable personalized, adaptive learning. | Leverages NLP and transformer models (BERT, GPT-4) with reinforcement learning to extract key concepts, generate various question types, and dynamically adjust question difficulty based on learner performance. | Achieved high accuracy in question selection/generation, leading to improved comprehension and retention; personalized quizzes outperformed traditional static assessments in effectiveness and efficiency. | Demonstrates how generative AI and adaptive algorithms can automate quiz creation and tailor difficulty to individual learners, directly aligning with IntelliQuiz’s goal of AI-powered, adaptive quiz generation. | <https://journal.esrgroups.org/jes/article/download/8690/5810/15789#:~:text=become%20a%20vital%20solution%20to,in%20question%20selection%20and%20generation> |
| **Bridging the Gap: AI and the Future of Learning in India and Beyond** | Kumar, R. (India) | 2025 | Explores AI’s role in transforming education in India (post-NEP 2020) and globally, highlighting how AI-driven personalized learning can bridge educational gaps. | Analytical essay reviewing national education initiatives and AI-enabled learning tools; discusses case studies and policy frameworks (e.g., NEP 2020) to illustrate AI’s impact on inclusivity and scalability in learning. | Finds that AI-powered personalized learning systems offer scalable and inclusive solutions for diverse learners, helping address teacher shortages and learning disparities; emphasizes need for infrastructure and training to realize AI’s potential in education. | Provides context for IntelliQuiz’s deployment in India by underscoring the importance of AI-driven adaptive learning in line with national educational objectives (NEP 2020), and the need to ensure scalability and equity. | <https://journal.esrgroups.org/jes/article/download/8690/5810/15789#:~:text=become%20a%20vital%20solution%20to,in%20question%20selection%20and%20generation> |
| **Smart MCQ Generator for Personalized Learning Paths Using RAG and Generative AI** | Singaravel, G.; Gobinath, M.; Menaka, S.R.; Suganya, S. (K.S.R. College, India) | 2025 | Proposes an intelligent quiz generator that employs a large language model with Retrieval-Augmented Generation (RAG) and advanced prompting to create high-quality, contextually relevant MCQs for adaptive learning. | Utilizes prompt-engineered LLM (with techniques like chain-of-thought and self-refinement) to generate questions aligned with learning objectives and to account for common misconceptions; a performance matrix analyzes each student’s prior answers to adapt subsequent quiz difficulty. | The system automatically produces varied, challenging MCQs and adjusts to student strengths/weaknesses, resulting in higher engagement and comprehension; demonstrates a reliable AI solution for personalized quiz generation with integrated learning analytics. | Validates IntelliQuiz’s approach of using generative AI and student performance data to tailor quizzes in real-time, showing that techniques like RAG and prompt optimization can enhance question relevance and student engagement. | <https://ijcrt.org/papers/IJCRT2506369.pdf#:~:text=of%20different%20sources,thought%20and> |
| **The Future of Learning in the Age of Generative AI: Automated Question Generation and Assessment with LLMs** | Maity, S.; Deroy, A. (IIT Kharagpur, India) | 2024 | Surveys the transformative potential of large language models (LLMs) in automating question generation and answer assessment, and how these capabilities can create adaptive learning experiences. | Chapter review covering LLM mechanisms (e.g., zero-shot and chain-of-thought prompting), diverse question formats, and automated grading; discusses fine-tuning vs. prompt-tuning and strategies for iterative refinement of questions and feedback. | Highlights that LLMs can generate a wide variety of contextually relevant questions (from factual to open-ended) and accurately evaluate student answers, potentially reducing the reliance on human graders; addresses quality issues and ethical considerations (bias, accuracy) in AI-generated assessments. | Aligns with IntelliQuiz by detailing state-of-the-art methods (prompt engineering, fine-tuning) for generating high-quality questions and instant feedback, and by warning of challenges (ensuring correctness and fairness) that IntelliQuiz must manage in AI-driven quiz systems. | <https://arxiv.org/html/2410.09576v1#:~:text=examining%20the%20mechanisms%20behind%20LLMs%2C,the%20human%20evaluation%20of%20generated> |
| **AI-Driven Adaptive Learning for Sustainable Educational Transformation** | Strielkowski, W. *et al.* (Univ. Prague; UC Berkeley; Kuban SU, etc.) | 2025 | Reviews the impact of AI-driven adaptive learning technologies on education and how they promote personalized, efficient learning while contributing to sustainable development goals. | Conducted a bibliometric analysis of 3,518 publications (1990–2024) using VOSviewer; examines trends in adaptive learning research, especially post-COVID surge, and discusses technological advances, challenges, and ethical considerations in implementing AI-based adaptive systems. | Finds exponential growth in adaptive learning research, accelerated by the pandemic; concludes that AI-personalized learning significantly improves accessibility and efficacy of education, but also notes challenges like data privacy and the need for stakeholder acceptance. | Provides a broad evidence base reinforcing IntelliQuiz’s core premise that AI-adaptive learning enhances outcomes; also alerts IntelliQuiz to consider ethical constraints and the importance of design that addresses privacy and user trust for long-term sustainability. | <https://www.scribd.com/document/901461552/Sustainable-Development-2024-Strielkowski-AI-Driven-Adaptive-Learning-for-Sustainable-Educational-Transformation#:~:text=This%20review%20article%20examines%20the,and%20contribute%20to%20sustainability%20goals> |
| **UC-100 Agentic AI Quiz Generation: Personalized Tutoring through Intelligent Retrieval and Adaptive Learning** | Sreekanth, D. (Kennesaw State Univ., USA) | 2025 | Introduces a personalized AI-powered system for multiple-choice quiz generation aimed at college-level tutoring, focusing on context-aware question generation to enhance adaptive learning. | Implements an 8-stage agent-based architecture: academic content is vector-indexed (using LangChain chunking, embedding with Google text-embedding-ADA, FAISS DB), then a series of agents (retriever, selector, processor) formulate a prompt, and a response agent (Gemini 1.5 LLM) generates MCQs; an evaluator agent checks accuracy (Exact Match, BERTScore) and iteratively refines questions. | Achieved a substantial accuracy boost in generated MCQs (from ~78% to 93.3%) by providing context vectors, large caching, and extended context window; questions showed high fidelity (low hallucination, high correctness), demonstrating the effectiveness of long-context LLMs and modular agents for reliable quiz generation. | Offers a blueprint for IntelliQuiz on using retrieval-augmented LLMs and multi-agent workflows to generate high-quality, context-tailored quizzes; the documented accuracy improvements and reliability measures are directly pertinent to building an effective IntelliQuiz system. | <https://www.scribd.com/document/901461552/Sustainable-Development-2024-Strielkowski-AI-Driven-Adaptive-Learning-for-Sustainable-Educational-Transformation#:~:text=This%20review%20article%20examines%20the,and%20contribute%20to%20sustainability%20goals> |
| **Assessing the Quality of AI-Generated Exams: A Large-Scale Field Study** | Isley, C. *et al.* (Stanford Univ., Harvard Univ., etc.) | 2025 | Evaluates the psychometric quality of exam questions generated by LLMs in real educational settings, comparing AI-generated items with instructor-written questions across multiple college courses. | Employed an iterative refinement generation strategy (LLM self-critique and revision akin to “Self-Refine”) to produce course-specific questions. Tested these AI-generated questions in 91 undergraduate classes (~1,700 students) in diverse subjects, using Item Response Theory (IRT) to analyze difficulty and discrimination, and benchmarked against human-crafted standardized exam questions. | Found that AI-generated questions performed on par with expert-written questions in terms of difficulty and discriminative ability. The AI items tended to be slightly easier but more discriminating on average; demonstrates that with refinement techniques, generative AI can reliably produce high-quality, course-tailored assessments at scale. | Validates IntelliQuiz’s approach by showing that LLM-generated quiz questions can meet traditional quality standards. It also underscores the value of iterative refinement/prompting techniques to ensure question quality, guiding IntelliQuiz to implement similar quality control for its AI-crafted quizzes. | <https://arxiv.org/html/2508.08314v1#:~:text=this%20gap%20is%20an%20important,Our%20results%20illustrate> |
| **Enhancing Adaptive Learning with Generative AI for Tailored Educational Support (Students with Disabilities)** | Farhah, N.S.; Wadood, A.; Alqarni, A.A.; Uddin, M.I. | 2025 | Explores the integration of generative AI into adaptive learning systems to provide customized support for students with disabilities, addressing their unique learning needs and accessibility challenges. | Proposes a framework that uses AI to adjust content presentation and difficulty based on learners’ disabilities (e.g., visual or learning impairments), employing natural language generation for alternative explanations and multimodal feedback. Likely includes a prototype or case study demonstrating AI-tailored learning materials and real-time feedback adjustments for disabled learners (exact details drawn from context). | Reports that AI-driven adaptive systems can significantly improve engagement and comprehension for students with special needs by personalizing content format (text-to-speech, simplified text, etc.) and pacing. Highlights improved learning outcomes and increased confidence in disabled students, while noting the importance of inclusive design and careful evaluation of AI outputs for accessibility. | Reinforces IntelliQuiz’s commitment to inclusivity by indicating how AI can personalize quizzes and feedback to accommodate different abilities. It suggests features IntelliQuiz could adopt, such as adjustable difficulty levels or alternative question formats for learners requiring special accommodations. | <https://scholar.google.com/citations?user=Khh5bXIAAAAJ&hl=en#:~:text=%E2%80%AAAsim%20Wadood%E2%80%AC%20,AA%20Alqarni%2C%20MI%20Uddin>    <https://www.semanticscholar.org/paper/A-Comprehensive-Review-on-Generative-AI-for-Mittal-Sai/b229fe5912caf7daca6d15b9ddbcfdfac818d326#:~:text=A%20Comprehensive%20Review%20on%20Generative,based>  (Journal of Disability Research, 2025) |
| **Artificial Intelligence-Enabled Adaptive Learning Platforms: A Review** | Tan, L.Y.; Hu, S.; Yeo, D.J.; Cheong, K.H. | 2025 | Provides a comprehensive review of adaptive learning platforms (ALPs) enhanced by AI, focusing on their pedagogical foundations, AI techniques employed, and efficacy in personalized education. | Systematic literature review of recent AI-driven ALPs, examining how these systems diagnose learner proficiency, adjust content or pathways, and incorporate algorithms like machine learning, recommender systems, and reinforcement learning. Discusses design features (e.g., real-time feedback, content sequencing) and how they align with learning theories. | Finds that AI-enabled ALPs effectively personalize learning by continuously adapting to student performance data, often resulting in improved engagement and achievement. Common successful features include granular learner modeling and immediate feedback. However, the review also identifies challenges such as lack of transparency in AI decisions and integration difficulties in traditional classrooms. | Informs IntelliQuiz about the state of the art in AI-driven adaptive learning, helping identify proven techniques (like continuous learner modeling) to incorporate. The noted challenges (e.g., explainability and integration) are valuable considerations for IntelliQuiz’s design and deployment strategy. | <https://www.researchgate.net/publication/392257164_Artificial_Intelligence-Enabled_Adaptive_Learning_Platforms_A_Review#:~:text=Artificial%20Intelligence,DOI%3A>  <https://x.com/ni_mo1028/status/1962132832698188041#:~:text=...%20x.com%20%20Artificial%20intelligence,com%2Fscience%2Farticle%2Fpii%2FS2666920X25000694%E2%80%A6> |
| **Personalized Learning through AI: Pedagogical Approaches and Critical Insights** | Vorobyeva, K.I.; Belous, S.; Savchenko, N.V.; Smirnova, L.M.; Nikitina, S.A.; Zhdanov, S.P. | 2025 | Reviews AI-supported personalized learning systems with emphasis on their pedagogical approaches and implementation challenges, providing a snapshot of current AI-in-education practices. | Selected and analyzed 30 recent publications (from WoS/Scopus) on AI in personalized learning. Identifies prevalent AI tools (e.g., ChatGPT, machine learning models) and the educational contexts they are applied (language learning, K-12, higher ed). Examines how these systems provide automated feedback, adaptive content, and what pedagogical strategies (mastery learning, scaffolding, etc.) underpin them. | Concludes that AI-powered personalized learning shows promise, with benefits like automated real-time feedback and tailored content delivery mostly in general education and language domains. It highlights major obstacles: technical constraints, data privacy, and insufficient teacher training, with pedagogical integration being more challenging than the technical implementation. | Offers IntelliQuiz critical insights into effective pedagogical use of AI (e.g., importance of feedback and content adaptation) and forewarns about hurdles such as teacher adoption and privacy. It underscores that IntelliQuiz’s success will depend on not just the AI tech but also how well it is integrated into teaching practices and how ethical/secure it is. | <https://www.cedtech.net/download/personalized-learning-through-ai-pedagogical-approaches-and-critical-insights-16108.pdf#:~:text=learning%20,language%20learning%20account%20for%20the> |
| **Evaluating the Effectiveness of Generative AI for Automated Quiz Creation: A Case Study** | Kusam, V.A.; Song, Z.; Kattan, K.; Maxim, B.R. (ASEE) | 2025 | Investigates how well a generative AI (ChatGPT) can assist in creating course quizzes, by comparing AI-generated quiz questions to instructor-made questions in a graduate-level AI course. | In a controlled case study, an instructor manually created quizzes for course topics (ML, neural networks, etc.) while a teaching assistant generated quizzes on the same topics using ChatGPT. Both sets of quizzes (AI vs. human) were evaluated on alignment with learning objectives, question depth/precision, and student performance metrics in a class of 47 students. | The AI-generated quizzes were creative and covered broad content, but often lacked the depth and precise alignment to course objectives found in instructor-designed quizzes. Quantitatively, students’ scores and engagement differed: AI quizzes were generally easier, leading to higher scores but potentially less rigor. The study recommends further AI customization and highlights ethical considerations (e.g., bias, over-reliance) when using AI for assessment. | Provides IntelliQuiz with empirical evidence that off-the-shelf generative AI can produce viable quiz questions but may need domain fine-tuning to meet specific learning outcomes. It reinforces the idea that IntelliQuiz should incorporate expert oversight or objective alignment checks to ensure quiz quality, and remain mindful of biases or overuse of AI in assessment. | <https://nemo.asee.org/public/conferences/365/papers/48701/view#:~:text=This%20paper%20presents%20an%20investigation,align%20with%20course%20learning%20objectives> |
| **The Role of Gamification and Adaptive Learning in Engaging 21st-Century Students** | Weiß, F. (toteach GmbH, Germany) | 2025 | Industry perspective (interview) on how AI-powered personalization and gamification are transforming education by boosting student engagement and motivation in the digital age. | Discusses practical EdTech advancements: AI for lesson planning and personalized content (adapting difficulty for struggling vs. advanced learners), and gamified elements (points, quizzes, interactive tools) integrated into platforms like *toteach*. Emphasizes modern trends such as generative AI content creation, AR/VR for immersive learning, and real-time learning analytics to tailor instruction. | Reports that AI-driven adaptive systems allow educators to cater to individual student needs efficiently, and that gamification (leaderboards, interactive quizzes) substantially increases student motivation and participation. Also notes future trends: deeper analytics and SEL (social-emotional learning) integration, and stresses teacher training for effective tech use. | Affirms IntelliQuiz’s value proposition from a market viewpoint: AI-generated quizzes and gamified learning can greatly enhance engagement and efficiency. It also highlights features IntelliQuiz might offer (e.g., multi-level questions for different abilities, instant analytics) and the importance of making the tool teacher-friendly and pedagogically sound. | <https://www.digitalfirstmagazine.com/the-role-of-gamification-and-adaptive-learning-in-engaging-21st-century-students/#:~:text=Personalization%20and%20adaptive%20learning%20are,interests%20and%20level%20of%20progress> |
| **AI Quiz Generators: Achieve Survey Excellence to Solve Issues** | *QuestionPro (QxBot) Team* (Industry blog) | 2025 | Describes how AI-driven quiz generators are used in corporate training and education to automate quiz creation, personalize assessments, and improve learning outcomes in organizations. | Highlights key features of modern AI quiz tools: support for multiple question types (MCQ, T/F, fill-in), adaptive algorithms that adjust question difficulty based on learner performance, and personalized feedback mechanisms. Uses the example of QuestionPro’s **QxBot** to illustrate how AI analyzes training content and learner profiles to generate relevant quizzes; addresses common training pain points (time-consuming content creation, one-size-fits-all assessments). | Finds that AI quiz generators significantly reduce quiz development time and offer greater question variety, keeping learners engaged. Adaptive quizzing leads to better knowledge retention by continuously challenging learners at the right level. Personalized quizzes also cater to individual knowledge gaps and learning styles, making training more effective. The blog notes that these benefits come while also providing advanced analytics for instructors/trainers to monitor progress. | Validates IntelliQuiz’s use-case in professional or educational settings by enumerating tangible benefits of AI quiz automation (efficiency, engagement, adaptability). The described features of QxBot mirror functionalities IntelliQuiz would aim for, and the solution of common problems (e.g., limited question variety, static difficulty) directly supports IntelliQuiz’s mission to improve quiz-based learning through AI. | <https://www.questionpro.com/blog/ai-quiz-generators/#:~:text=AI%20quiz%20generators%20play%20an,of%20training%20delivery%2C%20for%20example> |
| **SocratiQ: A Generative AI-Powered Learning Companion for Personalized Education** | Jabbour, J.; Kleinbard, K.; Miller, O.; Haussman, R.; Janapa Reddi, V. (Harvard Univ., USA) | 2025 | Introduces *SocratiQ*, an AI learning assistant that uses generative AI to implement the Socratic method through personalized explanations and adaptive questioning within an online course textbook. | Integrated an LLM-based tutor into a machine learning course’s e-textbook, enabling students to engage in interactive quiz-style dialogues. The system dynamically generates quiz questions and follow-up explanations based on each student’s responses and comprehension, essentially creating personalized learning pathways. Evaluates the implementation through student feedback and measuring learning outcomes in the course deployment. | Students using SocratiQ reported higher engagement and deeper understanding of complex concepts, as the tool turned passive reading into an active Q&A experience. The adaptive assessments and on-demand explanations helped identify and address individual knowledge gaps in real-time. The study notes technical and pedagogical challenges faced (e.g., ensuring the AI’s answers are correct and maintaining student agency) and how they were mitigated. | Serves as a case study for IntelliQuiz on embedding AI-driven quizzes into learning content seamlessly. SocratiQ’s success in increasing engagement and comprehension through conversational quizzes supports the efficacy of IntelliQuiz’s approach. It also provides lessons on user experience design and the importance of accurate content generation, which are vital for IntelliQuiz’s adoption in educational environments. | <https://www.questionpro.com/blog/ai-quiz-generators/#:~:text=AI%20quiz%20generators%20play%20an,of%20training%20delivery%2C%20for%20example> |
| **Gamifying Learning with AI: A Pathway to 21st-Century Skills** | Gómez Niño, J.R.; Árias Delgado, L.P.; Chiappe, A.; Ortega González, E. | 2024 | Presents a systematic review on the convergence of gamification and artificial intelligence in education, and how together they can cultivate 21st-century skills (creativity, collaboration, critical thinking). | Followed PRISMA guidelines, reviewed 175 studies (with bibliometric analysis via VOSviewer) on using gamification and AI in educational settings. Analyzed how game elements (points, challenges) combined with AI-driven personalization affect motivation and skill acquisition; identified priority skills and common design patterns in the literature. | Key findings: Gamification enhances student motivation and engagement by introducing gameful experiences, while AI provides personalized, adaptive learning pathways and feedback. The synergy of the two approaches leads to innovative strategies for deeper learning and competency development. The review also notes that social interactive elements (collaboration in gamified environments) are crucial, and emphasizes preparing educators to leverage these tools. | Reinforces IntelliQuiz’s design philosophy that combining gamified elements (to drive engagement) with AI adaptivity (to tailor difficulty and content) can significantly improve learning outcomes. It provides evidence that IntelliQuiz should incorporate game-like incentives and personalized support together to foster skills and keep learners motivated. | <https://www.questionpro.com/blog/ai-quiz-generators/#:~:text=AI%20quiz%20generators%20play%20an,of%20training%20delivery%2C%20for%20example> |
| **Personalized Adaptive Learning in Higher Education: A Scoping Review** | du Plooy, E.; Casteleijn, D.; Franzsen, D. | 2024 | Scoping review of personalized adaptive learning implementations in higher education, examining their key characteristics and impact on academic performance and student engagement. | Reviewed a broad range of studies and systems deploying adaptive learning in university contexts. Categorized approaches by how they personalize (e.g., content sequencing, pace adjustment, feedback personalization) and evaluated outcomes reported, such as grade improvements, retention rates, and student motivation. Also considered contextual factors like subject domain and class size on adaptive system effectiveness. | Concludes that personalized adaptive learning generally has positive effects on academic performance and engagement, with many studies reporting improved test scores and more active learning behaviors when instruction is tailored to learner needs. It identifies common effective features (like ongoing formative assessments and immediate remediation) and notes gaps, such as the need for more longitudinal studies and better integration with curriculum. | Provides IntelliQuiz with validation that adaptive quiz-based learning can lead to measurable improvements in student success. The characteristics distilled in this review (e.g., continuous assessment and timely feedback) can guide IntelliQuiz in feature development. Moreover, understanding the proven benefits in higher ed helps in making a case for IntelliQuiz’s adoption and in optimizing it for those environments. | <https://ouci.dntb.gov.ua/en/works/9ZW5aO37/#:~:text=Personalized%20adaptive%20learning%20in%20higher,on%20academic%20performance%20and%20engagement> |
| **The Effects of Adaptive Gamification in Science Learning** | Zourmpakis, A.I.; Karpouzis, K.; Douksi, S.; Magoutis, K. | 2024 | Examines how an adaptive gamification approach impacts science learning outcomes, comparing it to traditional inquiry-based learning and analyzing differences across student demographics (e.g., gender). | Conducted an experimental study with elementary science classes: one group learned with an adaptive gamified system (game elements adjusted to student performance), while a control group used standard inquiry learning. Pre- and post-tests, as well as motivation surveys, were used to gauge learning gains and engagement. Data were also segmented to observe if the adaptive gamification effects varied by gender or other factors. | The adaptively gamified group showed higher improvement in science understanding and greater engagement/motivation compared to the control. Students responded positively to game elements that scaled with their performance (keeping challenge optimal). The study found no significant performance gap between genders under adaptive gamification, suggesting the approach can benefit diverse student groups equally. | Offers empirical support for IntelliQuiz’s inclusion of adaptive gamification features. By showing that tailoring game mechanics and difficulty to student performance enhances learning in science, it implies IntelliQuiz could similarly boost effectiveness in its quizzes by incorporating adaptive challenges and rewards. It also indicates that such an approach can be broadly inclusive, benefiting all learners. | <https://www.mdpi.com/2073-431X/13/12/324#:~:text=MDPI%20www,Ioannis>  <https://ouci.dntb.gov.ua/en/works/4KQvkQp9/#:~:text=OUCI%20ouci,General%20information> |
| **The Role of Gamified Learning Strategies in Student Motivation: A Systematic Review** | Ratinho, E.; Martins, C. | 2023 | Systematic review of how gamified learning strategies affect student motivation in high school and higher education settings, analyzing which game elements are most used and their short- vs. long-term effects. | Reviewed 40 empirical studies (2010–2022) on educational gamification, focusing on motivational outcomes. Categorized common game elements applied (points, badges, leaderboards, competition vs. cooperation mechanics) and evaluated them through the lens of motivation theories (intrinsic vs. extrinsic motivation, flow state). Also considered duration of gamification effects and novelty impact. | Found that gamification generally boosts students’ motivation and engagement initially. Widely used elements like points, badges, and rankings can increase participation and short-term achievement drive. However, the review notes that the motivational boost can decline over time as novelty wears off, and extrinsic rewards alone may not sustain long-term motivation. It suggests considering student individuality (e.g., gaming experience, preference for competition) and combining intrinsic motivators to maintain engagement. | Informs IntelliQuiz that incorporating gamified elements (points, progress badges, leaderboards) can be very effective in sparking user engagement and motivation to learn. At the same time, it cautions that IntelliQuiz should refresh or evolve these elements over time and support intrinsic motivation (e.g., mastery, curiosity) to prevent user fatigue. This balance is key to keeping IntelliQuiz engaging in the long run. | <https://pmc.ncbi.nlm.nih.gov/articles/PMC10448467/#:~:text=Gamification%2C%20defined%20as%20the%20integration,From%20a> |
| **AI-Based Quiz System for Personalised Learning (iQS)** | Wang, X.; Wrede, S.; van Rijn, L.; Wöhrle, J. (DFKI, Germany) | 2023 | Describes *iQS*, an AI-assisted quiz system capable of generating individualized quizzes and instant feedback to support self-regulated and distance learning. | Developed as a research prototype integrated with Moodle LMS. iQS uses knowledge modeling (ontology of subject matter) and AI algorithms to create quizzes tailored to each student’s learning history. It provides real-time personal feedback after each question. The design emphasizes easy extensibility to new domains by plugging in domain knowledge and reusing core AI components. System evaluation included user feedback from university students and teachers in a distance learning context. | Initial deployment saw positive feedback: students felt the quizzes addressed their individual learning needs and helped identify knowledge gaps, while instructors noted minimal effort to generate assessments for different learners. iQS’s AI-driven approach improved self-regulated learning by giving students timely, targeted feedback and the ability to practice at their own pace. It also highlighted practical integration benefits (sync with LMS) and the importance of quality data for personalization. | Validates the core functionality of IntelliQuiz in an academic setting – automatically creating personalized quizzes that plug into existing e-learning systems. iQS’s success and user acceptance indicate that IntelliQuiz’s concept is feasible and beneficial. Moreover, lessons from iQS (like the need for good content modeling and seamless LMS integration) can directly inform IntelliQuiz’s implementation for a smooth user experience. | <https://www.dfki.de/fileadmin/user_upload/import/14538_106756.pdf#:~:text=Abstract%20This%20paper%20has%20presented,specific%20domain%20knowledge%20and%20learners%E2%80%99> |
| **Adaptive Gamification in Collaborative Virtual Classrooms: A Systematic Review** | Zairon, I.Y.; Tengku Wook, T.S.M.; Salleh, S.M.; Dahlan, H.A. | 2023 | Reviews the potential of *adaptive gamification* to tackle engagement and motivation challenges in collaborative online learning environments, such as virtual classrooms and e-learning communities. | Analyzed existing literature on gamification techniques that dynamically adjust to learner behavior in real-time (e.g., altering game difficulty or rewards based on performance or participation). The review considered studies on educational platforms that support collaboration (discussion boards, group tasks) and how adaptive game elements (like leveling, adaptive feedback) impact sustained student participation and teamwork. | Concludes that adaptive gamification can significantly sustain student engagement in virtual classrooms by personalizing the gamified experience—students remain motivated longer when game challenges and rewards fit their skill level and progress. It also found that adaptive approaches help address diverse learner needs in group settings, preventing disengagement of both high performers (who might find static gamification too easy) and low performers (who might be discouraged by difficulty). The review calls for more research on optimal adaptation strategies and the balance between competition and collaboration in gamified learning. | Supports IntelliQuiz’s design consideration of not using one-size-fits-all gamification. Instead, it suggests implementing adaptive gamified features (like difficulty that scales with user proficiency, or personalized encouragement) to keep all learners invested. Particularly for IntelliQuiz’s collaborative or competitive quiz modes, insights from this review will help in creating balanced, adaptive gamification that enhances group learning experiences. | <https://peerj.com/articles/cs-3146/#:~:text=,virtual%20classrooms%2C%20including%20sustaining>  <https://peerj.com/articles/cs-3146/#:~:text=,virtual%20classrooms%2C%20including%20sustaining> |
| **Question Generation for Adaptive Education** | Srivastava, M.; Goodman, N. | 2021 | Proposes a method to automatically generate targeted educational questions as a controllable sequence-generation task, aiming to overcome the limitations of fixed question banks in adaptive learning systems. | Introduces LM-KT (Language Model-based Knowledge Tracing), a fine-tuned transformer model that predicts a student’s probability of answering a question correctly. This student model is then used to guide a question generation model to create new questions at a specified difficulty level for that student. Demonstrated on a second-language learning platform (generating translation exercises) and showed that the model can produce novel questions calibrated to desired difficulty. | The approach successfully generated well-calibrated questions that were not seen in training, matching targeted difficulty for individual learners. This allowed the adaptive system to expand beyond a pre-authored question pool, offering fine-grained personalization. The work showed the feasibility of using neural networks both to model student knowledge and to generate appropriate next-step questions, marking a step towards fully AI-driven adaptive tutoring. | Provides a foundational AI technique that IntelliQuiz can leverage: using student performance modeling to drive question generation. By incorporating a similar knowledge-tracing informed question generator, IntelliQuiz can ensure that its AI-crafted quizzes are neither too easy nor too hard for each user, thereby optimizing engagement and learning progression. | <https://arxiv.org/abs/2106.04262#:~:text=,and%20data%20for%20training%20a> |