

SHIFT FROM OBJECTIVE-FOCUSED TO COMPETENCY-FOCUSED EVALUATION: IMPLICATIONS FOR TEACHING AND LEARNING OF MATHEMATICS IN THE 21ST CENTURY

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ABSTRACT

The increasing complexity of the twenty-first-century world has continued to reshape educational goals, classroom practices, and evaluation systems across different levels of education. Mathematics education particularly faces growing pressure to move beyond traditional objective-focused evaluation that mainly emphasizes memorization, procedural accuracy, and examination performance. Contemporary societies now require learners who possess critical thinking, creativity, collaboration, problem-solving abilities, and practical application skills capable of addressing technological and economic challenges. This conceptual paper examines the shift from objective-focused evaluation to competency-focused evaluation and its implications for the teaching and learning of mathematics in the twenty-first century. The paper is anchored on Experiential Learning Theory developed by David Kolb and Competency-Based Education Theory which emphasize active learning, practical engagement, learner-centered instruction, and demonstration of measurable competencies. The paper discussed limitations associated with traditional assessment approaches and the growing relevance of competency-focused evaluation in promoting deeper understanding and authentic learning experiences in mathematics classrooms. Discussions in the paper indicate that competency-focused evaluation encourages reflective learning, creativity, collaboration, conceptual understanding, and real-life application of mathematical knowledge. The paper concludes that

transformative assessment approaches remain essential for improving mathematics teaching and learning outcomes in contemporary educational systems. It therefore suggests that adoption of competency-focused evaluation strategies in mathematics classrooms should be increased to promote meaningful learning and sustainable educational development.

Keywords: Competency-focused Evaluation, Objective-focused Evaluation, Mathematics Education, Experiential Learning Theory, Competency-Based Education Theory, Twenty-First-Century Learning

Introduction

Educational evaluation has experienced remarkable transformation as societies continue to redefine the purpose of schooling and the expected outcomes of learning. Traditional educational systems largely depended on objective-focused evaluation, where academic success was measured through learners' ability to recall information, reproduce procedures, and provide correct answers during examinations. Mathematics education particularly embraced this model because instructional effectiveness was often associated with mastery of formulas, computational speed, and examination performance (Brookhart, 2017). Assessment practices in many school systems therefore emphasized cognitive recall and procedural accuracy more than creativity, reasoning, or application of knowledge to real-life situations. Such approaches were strongly influenced by behaviorist theories of learning which viewed achievement as observable performance demonstrated through measurable instructional objectives (Schunk, 2020). Although objective-based evaluation contributed to curriculum standardization and accountability, educational realities in the twenty-first century have exposed important limitations in its ability to prepare learners for complex societal and technological challenges.

Objective-focused evaluation emerged prominently from Tyler's curriculum model which emphasized clearly defined instructional objectives and measurable learning outcomes (Ornstein & Hunkins, 2018). Mathematics classrooms consequently prioritized completion of syllabus content, repetitive exercises, and examination preparation as major indicators of educational achievement. Bloom's taxonomy also contributed significantly to structured instructional planning and assessment by categorizing educational objectives into measurable domains (Anderson & Krathwohl, 2001). Within this framework, mathematics teachers commonly relied on written tests and standardized examinations to determine learners' competence. While these practices improved comparability and grading efficiency, they gradually attracted criticism for encouraging rote memorization and limiting

deeper conceptual understanding. Many learners successfully passed examinations yet struggled to apply mathematical knowledge to practical, technological, and collaborative contexts beyond the classroom environment.

According to Darling-Hammond and Oakes (2021) the emergence of digital economies, globalization, artificial intelligence, and rapid technological advancement has fundamentally altered the skills required for survival and productivity in contemporary societies. Modern educational systems are increasingly expected to produce graduates who can think critically, solve unfamiliar problems, collaborate effectively, communicate ideas clearly, and adapt to changing environments. Such realities have shifted educational attention from memorization-driven assessment toward competency-focused evaluation that emphasizes practical application of knowledge and transferable skills. International educational organizations such as the Organisation for Economic Co-operation and Development and the United Nations Educational, Scientific and Cultural Organization continue to advocate educational reforms that prioritize competencies needed for lifelong learning and sustainable development (OECD, 2019; UNESCO, 2021). Mathematics education is therefore no longer viewed merely as mastery of calculations and formulas, but increasingly as a tool for innovation, analytical reasoning, data interpretation, and technological problem-solving.

Competency-focused evaluation according to Suurtamm et al. (2016) promotes assessment strategies capable of measuring learners' reasoning processes, communication skills, collaboration, creativity, and application of mathematical knowledge in authentic situations. Global educational reforms in countries such as Finland, Singapore, Canada, and Australia increasingly emphasize competency-based curricula and learner-centered assessment systems that encourage critical thinking and problem-solving abilities. Mathematics teachers are now encouraged to use project-based tasks, performance assessments, portfolios, reflective exercises, peer assessments, and technology-supported evaluation methods that capture broader dimensions of learning. These reforms acknowledge that examination scores alone cannot adequately represent learners' readiness for participation in technologically driven societies and modern workplaces.

Competency-based mathematics assessment recognizes that no single assessment technique can adequately evaluate all mathematical competencies required in contemporary education (Kitta & Likinjie, 2020). Assessment practices must therefore accommodate creativity, inquiry, collaboration, modelling, and practical problem-solving experiences that extend beyond traditional classroom testing. Contemporary mathematics classrooms increasingly integrate digital technologies, simulations, virtual learning platforms, and data-driven instructional approaches which require corresponding transformation in evaluation methods. Vilalta Riera et al. (2024) further noted that competency-based mathematics instruction encourages richer classroom activities that

integrate cognitive demand, contextual learning, and active learner participation. Such approaches align more closely with the realities of knowledge economies where individuals are expected to apply mathematical thinking to workplace innovation, scientific advancement, entrepreneurship, and technological development.

Niyibizi and Mutarutinya (2024) found that innovative assessment approaches and timely feedback significantly improve students' engagement, comprehension, and problem-solving abilities in mathematics education. Learners become more motivated when assessment allows them to actively participate in projects, collaborative activities, and practical applications of mathematical concepts. Competency-focused evaluation also promotes reflective learning because students are encouraged to demonstrate understanding through authentic performance rather than simple memorization of procedures. Educational systems that continue to rely heavily on objective-focused examinations may therefore struggle to produce learners equipped with the critical competencies required for twenty-first-century citizenship and employment.

Persistent dependence on examination-oriented evaluation has generated growing concerns regarding the quality of mathematics learning outcomes across many educational systems. Several learners demonstrate high examination scores but encounter difficulties applying mathematical concepts to real-world situations, technological innovations, and interdisciplinary problem-solving tasks (Niss & Højgaard, 2019). Mathematics anxiety, low learner engagement, poor critical thinking skills, and weak problem-solving competence continue to challenge teachers and educational administrators globally. These concerns constitute the major problem motivating this conceptual paper. The purpose of the study is to examine the shift from objective-focused evaluation to competency-focused evaluation and its implications for the teaching and learning of mathematics in the twenty-first century. Attention is directed toward understanding how transformative assessment practices can improve learner engagement, instructional effectiveness, competency acquisition, and meaningful application of mathematical knowledge.

The significance of this study lies in its contribution to ongoing educational reforms aimed at improving mathematics teaching and learning. Teachers may gain valuable insights into innovative assessment approaches capable of promoting creativity, collaboration, critical thinking, and learner-centered instruction. Curriculum planners and policymakers may also benefit from understanding how competency-focused evaluation aligns mathematics education with global workforce expectations and technological advancement. Students stand to benefit from assessment systems that emphasize practical understanding and authentic learning experiences rather than excessive dependence on rote memorization. Discussions surrounding the transition from objective-focused to

competency-focused evaluation therefore remain highly relevant to contemporary efforts aimed at transforming mathematics education for effective participation in modern knowledge societies.

Theoretical Foundations

The experiential learning and competency-based education theories provide good theoretical foundations for competency-focused evaluation and its implication for teaching and learning of mathematics education in the 21st century.

Experiential Learning Theory and its relevance

Experiential Learning Theory was propounded by David A. Kolb in 1984 to explain how learners acquire knowledge through experience, reflection, conceptualization, and active experimentation. The theory emphasizes that meaningful learning occurs when individuals actively engage in practical activities and subsequently reflect on their experiences to develop deeper understanding and improved performance (Kolb, 2015). Kolb explained that learning is a continuous process involving four interconnected stages namely concrete experience, reflective observation, abstract conceptualization, and active experimentation. Educational practices influenced by this theory therefore encourage learner participation, inquiry, collaboration, creativity, and practical application of knowledge rather than passive memorization of facts. Contemporary educational systems increasingly recognize experiential learning as an effective approach for preparing learners to function within technologically driven and problem-oriented societies (Morris, 2020).

Experiential Learning Theory is highly relevant to the shift from objective-focused to competency-focused evaluation in mathematics education because it supports learner-centered instructional approaches that promote practical understanding and authentic application of mathematical concepts. Traditional objective-focused evaluation often concentrates on learners' ability to reproduce formulas and provide correct answers during examinations, while experiential learning emphasizes active engagement and problem-solving in real-life situations (Yardley et al., 2018). Mathematics classrooms influenced by experiential learning encourage learners to participate in projects, simulations, collaborative activities, investigations, and reflective tasks capable of strengthening conceptual understanding and analytical reasoning. Such practices align closely with competency-focused evaluation which measures learners' ability to apply mathematical knowledge effectively in diverse contexts rather than merely recalling information from memory.

The theory further provides strong support for twenty-first-century mathematics education because modern societies increasingly require learners who possess critical thinking, creativity,

collaboration, adaptability, and technological competencies. Mathematics teachers are therefore expected to adopt innovative instructional and assessment strategies capable of improving learner engagement and meaningful participation in classroom activities (Kolb & Kolb, 2017). Competency-focused evaluation grounded in experiential learning consequently promotes deeper learning experiences and better prepares learners for contemporary workplace and societal demands.

Competency-Based Education Theory and its relevance

Competency-Based Education was popularized by Benjamin S. Bloom and other educational reform scholars during the 1960s and 1970s as an instructional approach designed to emphasize mastery of clearly defined competencies rather than mere completion of instructional content. The theory emerged from growing concerns that traditional educational systems focused excessively on memorization, time-based progression, and examination scores without adequately ensuring learners' ability to apply knowledge in practical situations (Mulder, 2017). Competency-Based Education emphasizes learner-centered instruction, measurable performance outcomes, mastery learning, practical application of knowledge, and continuous assessment processes that support skill development and lifelong learning. Educational achievement within this framework is therefore determined by demonstrated competence and meaningful understanding rather than by simple recall of information or routine examination performance (Sturgis, 2018).

Contemporary educational systems increasingly adopt Competency-Based Education because modern societies require graduates who possess critical thinking, creativity, collaboration, adaptability, communication skills, and problem-solving abilities suitable for technologically driven environments. Mathematics education particularly benefits from this theory because it encourages instructional and assessment approaches capable of helping learners apply mathematical concepts to authentic situations and real-world challenges (OECD, 2019). Traditional objective-focused evaluation often emphasizes procedural accuracy and rote memorization of formulas, while competency-based approaches prioritize conceptual understanding, reasoning abilities, inquiry, modelling, and analytical thinking. Mathematics classrooms influenced by Competency-Based Education consequently encourage learners to participate actively in projects, investigations, reflective tasks, collaborative activities, and practical problem-solving experiences that promote deeper understanding and sustained engagement.

The relevance of Competency-Based Education to the conceptual paper titled "Shift from Objective-focused to Competency-focused Evaluation: Implications for Teaching and Learning of Mathematics in the 21st Century" lies in its strong support for transformative assessment practices that align with contemporary educational demands. Competency-focused evaluation encourages

teachers to assess learners' ability to apply mathematical knowledge creatively and effectively in diverse contexts rather than merely reproducing memorized procedures during examinations (Levine & Patrick, 2019). Such evaluation approaches improve learner participation, critical reasoning, innovation, and independent learning skills required in knowledge economies and digital societies. Competency-Based Education therefore provides a suitable theoretical foundation for understanding the growing transition toward learner-centered mathematics instruction and authentic assessment practices in the twenty-first century.

Conceptual Clarifications

Objective-focused Evaluation

Objective-focused evaluation refers to an assessment approach where teaching and learning activities are organized around clearly stated instructional objectives and measurable outcomes. The approach became prominent through the educational contributions of Ralph W. Tyler whose curriculum model emphasized the achievement of predetermined learning objectives through systematic instruction and testing (Ornstein & Hunkins, 2018). Within this framework, teachers determine specific objectives before instruction begins, while learners are evaluated according to how successfully they achieve those objectives during examinations and classroom assessments.

Mathematics education traditionally relied heavily on objective-focused evaluation because mathematical performance could easily be measured through correct answers, procedural accuracy, and mastery of formulas. Brookhart (2017) explained that objective-focused assessment promotes accountability and helps teachers determine whether instructional goals have been achieved. Teachers commonly use written examinations, quizzes, assignments, and multiple-choice tests to assess learners' understanding of mathematical concepts. For instance, students may be instructed to solve twenty algebraic equations within a limited time, calculate percentages correctly, or provide exact answers to geometry problems during examinations. Success in such situations depends mainly on memorization, speed, and procedural accuracy.

Practical classroom activities under objective-focused evaluation often emphasize repetition and examination preparation. A mathematics teacher may repeatedly demonstrate how to solve quadratic equations and later evaluate learners through a written test requiring them to follow identical procedures. Learners preparing for external examinations such as the West African Senior School Certificate Examination frequently practice past questions repeatedly to improve examination performance. Such assessment practices help learners master foundational concepts and improve examination readiness (Schunk, 2020). Educational administrators also depend on objective-focused

evaluation because standardized examination scores provide measurable indicators for promotion, certification, and comparison across schools.

Despite these advantages, several educational scholars continue to express concerns regarding excessive dependence on objective-focused evaluation in contemporary classrooms. Darling-Hammond and Oakes (2021) maintained that memorization-driven assessment limits creativity, critical thinking, collaboration, and real-world application of knowledge. Many learners successfully solve classroom mathematics problems yet encounter difficulties applying mathematical reasoning to practical situations such as budgeting, business calculations, engineering design, data interpretation, or financial planning. Mathematics instruction dominated entirely by examination preparation may therefore encourage surface learning rather than conceptual understanding and innovation.

Competency-focused Evaluation

Competency-focused evaluation refers to an assessment approach that measures learners' ability to apply knowledge, demonstrate practical competence, solve problems, collaborate effectively, and perform meaningful tasks in authentic situations. The approach emerged from growing educational concerns that traditional examination systems were not adequately preparing learners for rapidly changing technological, social, and workplace realities (Mulder, 2017). Competency-focused evaluation therefore emphasizes what learners can practically do with acquired knowledge rather than what they can merely recall from memory during tests. Levine and Patrick (2019) explained that competency-focused education promotes mastery learning, learner participation, practical engagement, continuous assessment, and demonstration of measurable competencies across different learning contexts. Mathematics education within this framework encourages learners to engage actively in investigations, projects, collaborative tasks, modelling activities, reflective exercises, and problem-solving experiences capable of developing deeper understanding. Assessment methods commonly associated with competency-focused evaluation include portfolios, presentations, practical demonstrations, case studies, group projects, simulations, and inquiry-based activities.

Practical examples of competency-focused evaluation are increasingly visible in contemporary mathematics classrooms. A teacher may ask learners to prepare a household budget using percentages, profit and loss calculations, and data interpretation skills instead of merely answering theoretical questions on paper. Students may also be assigned group projects requiring them to measure school buildings and calculate dimensions, area, and volume using real-life mathematical applications. Technology-based activities such as spreadsheet analysis, graph plotting, coding

exercises, and statistical interpretation further strengthen learners' practical competencies and analytical reasoning abilities (Niss & Højgaard, 2019).

International educational organizations such as the Organisation for Economic Co-operation and Development and the United Nations Educational, Scientific and Cultural Organization continue to advocate educational systems that prioritize creativity, innovation, communication, collaboration, and lifelong learning competencies required for modern societies (OECD, 2019; UNESCO, 2021). Competency-focused evaluation aligns closely with these expectations because it encourages learners to apply mathematical knowledge in solving practical and interdisciplinary problems. Learners become more actively engaged when mathematics instruction connects classroom activities with everyday experiences and future career opportunities.

Competency-focused evaluation also supports learner confidence and independent thinking because assessment extends beyond examination scores alone. Teachers gain broader understanding of learners' strengths, creativity, communication abilities, and practical reasoning through authentic assessment activities. Such approaches remain highly relevant in technologically driven societies where individuals are increasingly expected to analyze information critically, adapt to changing environments, and solve unfamiliar problems effectively. Mathematics education in the twenty-first century therefore requires assessment practices capable of nurturing both conceptual understanding and practical competence for sustainable learning and societal development.

Mathematics Teaching and Learning in the 21st Century

Mathematics teaching and learning in the twenty-first century has undergone remarkable transformation due to technological advancement, globalization, digital communication, and the increasing demand for problem-solving and analytical skills in modern societies. Traditional mathematics instruction largely emphasized memorization of formulas, repetitive exercises, and teacher-centered classroom practices where learners depended heavily on direct instruction and examination preparation. Contemporary educational systems now place greater attention on learner-centered approaches that encourage critical thinking, collaboration, creativity, inquiry, and practical application of mathematical concepts in real-life situations (Boaler, 2019). Mathematics education is therefore no longer viewed merely as mastery of computation and procedural accuracy, but increasingly as an important tool for innovation, scientific reasoning, technological development, and informed decision-making. Darling-Hammond et al. (2020) explained that twenty-first-century classrooms require instructional approaches capable of preparing learners for rapidly changing technological and workplace environments. Mathematics teachers are increasingly expected to integrate digital tools such as calculators, spreadsheets, interactive simulations, virtual learning

platforms, and educational software into classroom instruction. Such technologies improve learner engagement, conceptual understanding, and participation in collaborative problem-solving activities. Learners now participate more actively in investigations, projects, modelling exercises, and inquiry-based tasks that connect mathematics with practical experiences in science, engineering, finance, business, and technology. Classroom interaction has consequently shifted from passive listening toward active participation and reflective learning experiences.

International educational reforms continue to emphasize competencies such as communication, creativity, adaptability, data interpretation, and critical reasoning as essential outcomes of mathematics education in contemporary societies (OECD, 2019). Mathematics learning in the twenty-first century therefore extends beyond obtaining correct answers to include understanding processes, justifying solutions, analyzing patterns, and applying mathematical knowledge to unfamiliar situations. Teachers are increasingly encouraged to adopt innovative assessment strategies such as projects, portfolios, collaborative tasks, and performance-based activities capable of measuring learners' practical competencies and deeper understanding (Niss & Højgaard, 2019). Such developments remain highly important because modern economies increasingly depend on individuals who can think logically, solve complex problems, and apply mathematical reasoning effectively in technologically driven environments.

Modern Mathematics Education

Modern mathematics education refers to contemporary instructional and learning practices designed to equip learners with mathematical knowledge, problem-solving abilities, technological competencies, and critical thinking skills required for participation in rapidly changing societies. Unlike traditional mathematics education which focused mainly on memorization of formulas and procedural accuracy, modern mathematics education emphasizes conceptual understanding, learner participation, creativity, collaboration, and practical application of mathematical ideas in real-life situations. Boaler (2019) explained that contemporary mathematics instruction encourages learners to think flexibly, communicate ideas clearly, and engage actively in meaningful learning experiences capable of improving confidence and analytical reasoning. Modern mathematics education therefore aligns with twenty-first-century educational goals that prioritize innovation, adaptability, and lifelong learning competencies.

Characteristics of modern mathematics education

Mathematics education has evolved from an approach centred on rote learning and procedural mastery to one that emphasizes conceptual understanding, critical thinking, problem-solving, and

the practical application of knowledge. Contemporary mathematics instruction encourages learners to actively construct meaning, collaborate with peers, and utilize technology to enhance learning experiences (National Council of Teachers of Mathematics [NCTM], 2000). Such an approach equips learners with the competencies required for lifelong learning, informed decision-making, and effective participation in an increasingly knowledge-driven and technologically advanced society (Kilpatrick et al., 2001). The characteristics are discussed here-under:

Learner-Centered Instruction

Learner-centred instruction is widely recognized as a defining feature of modern mathematics education. Rather than relying on teacher-dominated lessons and rote memorization, contemporary mathematics classrooms emphasize active learner participation, critical thinking, and meaningful engagement with mathematical concepts. Students are encouraged to explore ideas, interact with peers, and construct knowledge through collaborative learning experiences that promote deeper understanding (Bransford et al., 2000). Darling-Hammond et al. (2020) maintained that learner-centered instructional approaches improve classroom engagement, reflective thinking, and conceptual understanding because students participate actively in the learning process. Mathematics learners are therefore encouraged to ask questions, share ideas, and solve problems collaboratively.

Integration of Technology

Technology integration has become a defining feature of modern mathematics education due to advancements in digital communication and educational innovation. Mathematics classrooms increasingly utilize calculators, interactive whiteboards, educational applications, spreadsheets, simulations, and online learning platforms to improve teaching and learning experiences. Pepin et al. (2022) noted that digital technologies help learners visualize mathematical concepts, analyze data effectively, and participate in interactive learning activities. Technology also supports personalized instruction because learners can access digital resources and practice activities suited to their individual learning needs and pace.

Emphasis on Problem-Solving and Critical Thinking

Modern mathematics education places strong emphasis on problem-solving and critical thinking skills needed for functioning effectively in technologically driven societies. Learners are expected to apply mathematical concepts to practical situations rather than merely reproducing memorized procedures during examinations. Niss and Højgaard (2019) explained that contemporary mathematics instruction encourages reasoning, modelling, interpretation, and analytical thinking

through authentic learning activities. Classroom tasks often involve investigations, projects, data analysis, and real-life applications capable of improving learners' ability to think independently and solve unfamiliar problems.

Collaborative and Interactive Learning

Collaborative learning is another important characteristic of modern mathematics education. Learners frequently work in groups to discuss ideas, complete assignments, and solve mathematical problems collectively. Such interaction strengthens communication skills, teamwork, confidence, and peer learning experiences. Darling-Hammond et al. (2020) explained that collaborative classrooms improve learner motivation and participation because students benefit from shared experiences and collective reasoning processes. Mathematics teachers therefore encourage classroom discussions, cooperative learning activities, and peer-supported problem-solving exercises.

Competency-Based Assessment

Modern mathematics education also emphasizes competency-based assessment approaches capable of measuring learners' practical understanding and application of knowledge. Traditional examinations are increasingly supplemented with projects, presentations, portfolios, reflective activities, and performance-based tasks. Sturgis (2018) explained that competency-focused assessment measures learners' mastery of concepts, creativity, collaboration, and practical problem-solving abilities rather than simple recall of information. Such approaches provide broader understanding of learners' strengths and competencies required for modern workplaces and societal participation.

Paradigm Shift from Objective-focused to Competency-focused Evaluation

Educational evaluation has experienced significant transformation in recent decades due to changing societal expectations, technological advancement, globalization, and the growing demand for practical competencies in contemporary workplaces. Traditional educational systems largely depended on objective-focused evaluation where learners were assessed mainly through written examinations designed to measure recall of information, procedural accuracy, and achievement of predetermined instructional objectives. Mathematics education particularly relied on this approach because teachers could easily evaluate learners through tests requiring correct answers, memorization of formulas, and repetitive problem-solving exercises (Brookhart, 2017). Success in many classrooms was therefore determined by examination performance rather than by learners'

ability to apply mathematical knowledge to real-life situations and complex societal problems. Contemporary educational reforms increasingly emphasize competency-focused evaluation because modern societies require individuals who can think critically, solve unfamiliar problems, collaborate effectively, and apply knowledge creatively in different contexts. Darling-Hammond and Oakes (2021) explained that educational systems across the world are gradually shifting attention from memorization-driven assessment toward evaluation approaches capable of measuring practical understanding, innovation, adaptability, and problem-solving abilities. Competency-focused evaluation therefore emphasizes learners' ability to demonstrate mastery through authentic tasks and meaningful performance rather than through simple recall of information during examinations. Mathematics education within this framework now encourages deeper conceptual understanding, inquiry-based learning, and practical application of mathematical concepts to everyday experiences.

Several practical examples illustrate this paradigm shift in contemporary classrooms. Traditional objective-focused mathematics evaluation may require learners to solve twenty algebraic equations correctly within a fixed time during examinations. Competency-focused evaluation, however, may require students to use algebraic concepts to prepare a small business profit analysis, calculate transportation costs, or develop solutions to community-based financial problems. Such assessment practices help learners understand the practical value of mathematics beyond classroom examinations (Niss & Højgaard, 2019). Teachers increasingly assign projects, group investigations, presentations, reflective exercises, and real-life problem-solving activities capable of measuring creativity, collaboration, reasoning, and communication skills alongside mathematical competence. Technology integration has further accelerated the movement toward competency-focused evaluation in mathematics education. Pepin et al. (2022) noted that digital technologies such as spreadsheets, graphing software, online simulations, and virtual learning platforms provide learners with opportunities to apply mathematical reasoning to authentic and technologically relevant situations. Learners may now analyze statistical data using spreadsheets, interpret graphical information through educational software, or participate in collaborative online mathematical projects. Such activities encourage independent thinking, analytical reasoning, and practical engagement with mathematical concepts rather than passive memorization of formulas and procedures.

International educational organizations continue to advocate educational reforms that prioritize transferable competencies and lifelong learning skills suitable for rapidly changing societies. The Organisation for Economic Co-operation and Development emphasized that twenty-first-century education should prepare learners for innovation, collaboration, communication, and responsible participation in knowledge economies (OECD, 2019). Mathematics education consequently extends beyond computational accuracy to include modelling, critical thinking, interpretation of data, and

application of knowledge to scientific, technological, and economic challenges. Learners are therefore expected not only to obtain correct answers but also to explain reasoning processes, justify solutions, and apply concepts to unfamiliar situations. The paradigm shift from objective-focused to competency-focused evaluation also changes the role of teachers and learners within the classroom environment. Teachers increasingly function as facilitators who guide learners through inquiry, collaboration, experimentation, and reflective learning experiences. Learners become more actively involved in classroom activities through discussions, investigations, projects, and peer-supported tasks that strengthen confidence and participation. Competency-focused evaluation therefore promotes meaningful learning experiences capable of preparing learners for contemporary societal demands and future career opportunities. Mathematics education in the twenty-first century consequently requires transformative assessment approaches that support both conceptual understanding and practical competence for sustainable educational development.

Differences between Objective-focused and Competency-focused Evaluation

Objective-focused evaluation and competency-focused evaluation represent two major approaches used in assessing teaching and learning outcomes within educational systems. Objective-focused evaluation emphasizes the achievement of predetermined instructional objectives through measurable academic performance, while competency-focused evaluation emphasizes learners' ability to apply knowledge, demonstrate practical skills, and solve real-life problems effectively. Traditional educational systems largely depended on objective-focused assessment because it provided standardized procedures for measuring learners' academic achievement through examinations, quizzes, and assignments (Brookhart, 2017). Competency-focused evaluation, however, emerged from growing concerns that examination-oriented assessment alone could not adequately prepare learners for the demands of technologically driven and knowledge-based societies.

One major difference between the two approaches lies in their instructional orientation and educational focus. Objective-focused evaluation concentrates mainly on mastery of content, memorization of information, and successful achievement of specific instructional objectives determined by teachers and curriculum planners. Learners are usually expected to provide correct answers during written examinations and classroom tests. In mathematics education, for instance, students may be assessed based on their ability to solve equations correctly, recall formulas, or complete computational exercises accurately within a limited time. Competency-focused evaluation, on the other hand, places greater attention on learners' ability to apply mathematical knowledge practically in authentic situations such as budgeting, financial analysis, engineering calculations, or statistical interpretation (Niss & Højgaard, 2019).

Another important difference exists in the methods and techniques used for assessment. Objective-focused evaluation commonly utilizes standardized examinations, multiple-choice questions, quizzes, and paper-and-pencil tests that measure cognitive achievement and procedural accuracy. Such methods often encourage repetition and examination preparation because learners focus primarily on obtaining correct answers. Competency-focused evaluation adopts broader assessment strategies such as projects, presentations, portfolios, collaborative tasks, simulations, investigations, and performance-based activities capable of measuring critical thinking, creativity, communication, and problem-solving abilities (Levine & Patrick, 2019). Mathematics learners under competency-focused assessment may therefore participate in group projects requiring them to analyze business profits, interpret graphical data, or solve community-based problems using mathematical reasoning.

Differences also exist in the roles assigned to teachers and learners within the classroom environment. Objective-focused evaluation often promotes teacher-centered instruction where teachers dominate classroom activities and learners depend heavily on direct instruction and memorization of concepts. Competency-focused evaluation encourages learner-centered instruction where teachers function more as facilitators guiding learners through inquiry, collaboration, experimentation, and reflective learning experiences. Darling-Hammond and Oakes (2021) explained that competency-focused learning environments strengthen learner engagement and independent thinking because students actively participate in investigations, discussions, and practical problem-solving activities.

Technology integration further distinguishes competency-focused evaluation from traditional objective-focused approaches. Contemporary educational systems increasingly utilize digital technologies, simulations, online learning platforms, spreadsheets, and data-analysis tools to support practical learning experiences and authentic assessment (Pepin et al., 2022). Objective-focused evaluation may still rely mainly on written examinations and routine classroom testing without fully integrating technological applications. Competency-focused evaluation, however, encourages learners to apply mathematical knowledge using modern technological tools capable of improving analytical reasoning and practical competence.

Differences between these two approaches also appear in the expected learning outcomes. Objective-focused evaluation mainly measures learners' academic performance and mastery of instructional content, whereas competency-focused evaluation seeks to develop adaptable competencies such as creativity, collaboration, critical thinking, communication, and lifelong learning skills suitable for modern societies. Educational reforms across the world increasingly support competency-focused evaluation because contemporary workplaces require individuals capable of applying knowledge effectively in solving unfamiliar and complex problems (OECD, 2019). Mathematics education in

the twenty-first century therefore increasingly requires assessment approaches capable of promoting both conceptual understanding and practical competence necessary for sustainable educational development.

Emerging Assessment Practices in Mathematics

Emerging assessment practices in mathematics refer to innovative evaluation approaches designed to measure learners' conceptual understanding, practical competence, analytical reasoning, creativity, and problem-solving abilities within contemporary learning environments. Traditional mathematics assessment relied mainly on written examinations, memorization of formulas, and procedural accuracy. Modern educational reforms now encourage assessment systems capable of capturing broader dimensions of learning and preparing students for technologically driven societies. Niss and Højgaard (2019) explained that mathematics assessment in the twenty-first century increasingly emphasizes reasoning, communication, modelling, inquiry, and application of knowledge in authentic situations. Such transformation has encouraged teachers and educational institutions to adopt learner-centered and competency-focused assessment strategies that promote meaningful participation and deeper understanding.

Performance-Based Assessment

Performance-based assessment has become one of the major emerging practices in mathematics education because it evaluates learners through practical activities and authentic problem-solving tasks. Learners are often required to demonstrate understanding through projects, presentations, modelling exercises, investigations, and real-life applications of mathematical concepts. Darling-Hammond and Oakes (2021) maintained that performance-based assessment strengthens learners' critical thinking and practical reasoning because students engage actively in meaningful tasks rather than depending solely on memorization. Mathematics learners may, for instance, prepare financial budgets, analyze business profits, interpret statistical data, or calculate measurements required for construction projects. Such activities help learners connect classroom knowledge with real-world experiences.

Technology-Based Assessment

Technology integration has significantly transformed mathematics assessment practices across different educational levels. Digital tools such as online quizzes, graphing applications, virtual simulations, spreadsheets, and learning management systems now support interactive and flexible assessment processes. Pepin et al. (2022) explained that technology-based assessment enhances

learner engagement and improves visualization of mathematical concepts through interactive learning experiences. Learners can use educational software to plot graphs, analyze datasets, perform statistical calculations, and participate in collaborative online mathematical activities. Technology also enables immediate feedback which helps learners identify errors and improve performance more effectively.

Formative and Continuous Assessment

Modern mathematics education increasingly emphasizes formative and continuous assessment as important tools for monitoring learner progress and improving instructional effectiveness. Formative assessment involves regular feedback, classroom interaction, observation, questioning, and short learning activities designed to identify learners' strengths and weaknesses during instruction. Brookhart (2017) noted that continuous assessment improves learning because learners receive timely guidance capable of correcting misconceptions before final evaluation. Mathematics teachers now use reflective journals, peer assessment, classroom discussions, homework reviews, and short practical exercises to support continuous improvement and active participation.

Collaborative and Peer Assessment

Collaborative and peer assessment practices are also gaining attention in contemporary mathematics classrooms because they encourage teamwork, communication, and reflective learning. Learners increasingly participate in group projects, cooperative investigations, and peer-review activities where they evaluate one another's mathematical reasoning and solutions. Such practices strengthen confidence, analytical thinking, and social interaction among learners. Panadero et al. (2018) explained that peer assessment improves learners' self-regulation and critical evaluation skills because students actively participate in the assessment process rather than depending entirely on teachers' judgments. Mathematics classrooms therefore become more interactive and learner-centered through collaborative evaluation activities.

Competency-Focused Assessment

Competency-focused assessment remains one of the most significant emerging trends in mathematics education because it measures learners' ability to apply mathematical knowledge effectively in diverse contexts. Assessment extends beyond examination scores to include creativity, communication, reasoning, adaptability, and problem-solving competence. OECD (2019) emphasized that modern educational systems should prioritize transferable competencies and lifelong learning skills needed in rapidly changing societies. Mathematics learners are therefore

assessed according to their ability to solve practical problems, justify reasoning processes, and apply concepts meaningfully in authentic situations. Such approaches better prepare learners for participation in modern workplaces and technologically advanced environments.

Implications for Mathematics Teaching

Mathematics teaching in the twenty-first century has undergone significant transformation as education systems increasingly adopt competency-focused evaluation. This shift places greater emphasis on equipping learners with practical skills, critical thinking, creativity, collaboration, and problem-solving abilities needed for lifelong learning and the modern workplace. Consequently, mathematics teachers are expected to adjust their instructional practices, assessment strategies, technological competence, and professional development to meet these evolving educational demands. The major implications for mathematics teaching include the following:

Learner-Centred Instruction: Competency-focused evaluation requires mathematics teachers to move away from teacher-dominated instruction toward learner-centred pedagogical approaches. Traditional mathematics teaching emphasized memorization of formulas, repetitive classroom exercises, and preparation for examinations. Contemporary educational reforms, however, require teachers to design learning experiences that encourage learners to apply mathematical knowledge in authentic and meaningful situations (Darling-Hammond & Oakes, 2021). Mathematics teachers therefore serve as facilitators who promote inquiry, investigation, collaboration, and reflective learning rather than merely transmitting knowledge.

Active Classroom Engagement: Modern mathematics classrooms encourage learners to participate actively in discussions, collaborative activities, projects, and exploratory tasks. Teachers are expected to create supportive learning environments where students ask questions, justify their reasoning, exchange ideas, and solve problems collectively. Such classroom interactions strengthen conceptual understanding and analytical reasoning instead of relying solely on procedural memorization (Boaler, 2019).

Diversification of Assessment Methods: Competency-focused evaluation demands the use of multiple assessment strategies that capture learners' knowledge, skills, and competencies more comprehensively. In addition to written examinations, mathematics teachers are expected to utilize projects, portfolios, presentations, investigations, simulations, and performance-based tasks to assess learning outcomes (Brookhart, 2017). Practical activities such as budgeting, statistical analysis, measurement, and graphical interpretation help learners appreciate the real-world applications of mathematics.

Integration of Digital Technology: Contemporary mathematics teaching increasingly depends on technology to enhance instruction and learner engagement. Digital tools such as graphing software, spreadsheets, online learning platforms, virtual simulations, and educational applications make abstract mathematical concepts easier to understand while promoting interactive learning experiences. Teachers are therefore expected to develop adequate technological competence to support modelling, data analysis, visualization, and collaborative problem-solving in mathematics classrooms (Pepin et al., 2022).

Continuous Professional Development: The evolving nature of mathematics education places greater responsibility on teachers to engage in continuous professional learning. Mathematics teachers need to remain current with emerging instructional approaches, competency-based assessment practices, and technological innovations that improve classroom effectiveness. Educational institutions consequently have the responsibility to provide regular training opportunities, adequate instructional resources, and supportive learning environments that enable teachers to respond effectively to ongoing educational reforms.

Implications for Mathematics Learning

The shift toward competency-focused evaluation has significantly transformed mathematics learning in the twenty-first century. Rather than emphasizing passive memorization of formulas and procedures, contemporary mathematics education seeks to develop learners who can think critically, solve problems creatively, communicate effectively, and apply mathematical knowledge in real-life situations. As a result, students are expected to participate actively in their learning and develop competencies that prepare them for further education, employment, and everyday decision-making. The major implications for mathematics learning include the following:

Active and Meaningful Learning

Competency-focused learning encourages students to become active participants in the learning process rather than passive recipients of information. Learners are expected to think independently, solve unfamiliar problems, interpret information, and apply mathematical ideas in different contexts. This approach makes mathematics more meaningful because students connect classroom learning with real-life experiences and societal challenges (Niss & Højgaard, 2019).

Increased Motivation and Participation

Learner-centered instructional environments improve students' motivation, confidence, and participation because learners engage in discussions, investigations, collaborative projects, and reflective activities (Darling-Hammond et al., 2020). Mathematics students now participate in practical tasks such as analyzing community data, preparing business calculations, interpreting charts, and solving technological problems using mathematical reasoning. Such activities strengthen conceptual understanding and help learners transfer knowledge to authentic situations beyond the classroom.

Development of Twenty-First-Century Skills

Competency-focused mathematics learning promotes important skills such as communication, collaboration, creativity, and adaptability. Learners increasingly work in groups, share ideas, justify their solutions, and support one another during learning activities. These experiences improve interpersonal relationships and build confidence in expressing mathematical reasoning, making learning less focused on examination anxiety and more focused on understanding and inquiry.

Technology-Enhanced Learning

Digital technologies have become an important part of modern mathematics learning. Learners use educational software, calculators, online simulations, and virtual learning platforms to visualize concepts, analyze information, and solve problems interactively (Pepin et al., 2022). Technology-supported environments also provide immediate feedback that helps learners identify errors and improve understanding more effectively, thereby encouraging independent learning and strengthening digital competencies.

Preparation for Lifelong Learning and Employment

Modern economies increasingly require individuals who can apply knowledge creatively, think critically, and adapt to changing environments (OECD, 2019). Competency-focused mathematics learning therefore equips learners with transferable skills relevant to science, engineering, business, technology, and everyday decision-making. Mathematics education consequently aims not only at academic success but also at preparing learners for productive participation in technologically driven and knowledge-based societies.

Challenges of Competency-focused Evaluation in Mathematics

Competency-focused evaluation has gained increasing attention in contemporary mathematics education because of its emphasis on practical understanding, critical thinking, creativity, and application of knowledge in authentic situations. Despite its educational benefits, several challenges continue to affect its effective implementation across different educational systems and classroom environments. Traditional educational practices in many countries still depend heavily on examination-oriented assessment, making the transition toward competency-focused evaluation difficult for teachers, learners, and educational administrators (Levine & Patrick, 2019). Mathematics classrooms particularly experience implementation challenges because many educational systems continue to prioritize standardized examinations and certification processes based mainly on cognitive recall and procedural accuracy.

One major challenge associated with competency-focused evaluation in mathematics is inadequate teacher preparation and professional competence. Many mathematics teachers were trained within traditional objective-focused systems that emphasized memorization, repetitive exercises, and written examinations. Competency-focused evaluation, however, requires teachers to design projects, investigations, collaborative tasks, practical activities, and authentic assessment procedures capable of measuring broader learning outcomes (Darling-Hammond & Oakes, 2021). Teachers who lack adequate training in learner-centered instructional strategies and competency-based assessment methods may experience difficulties implementing such approaches effectively within classrooms. Assessment planning, scoring procedures, and evaluation of practical competencies often require additional instructional skills and professional support.

Large class size also presents serious challenges to competency-focused evaluation in mathematics education. Brookhart (2017) explained that effective competency-based assessment requires continuous observation, feedback, learner interaction, and individualized support which become difficult in overcrowded classrooms. Mathematics teachers handling large numbers of students may struggle to monitor projects, evaluate portfolios, supervise collaborative activities, and provide timely feedback to learners. Such conditions may discourage teachers from adopting innovative assessment approaches and instead encourage continued dependence on traditional written examinations which are easier to administer and grade.

Limited instructional resources and inadequate technological infrastructure further hinder the implementation of competency-focused evaluation. Contemporary mathematics assessment increasingly depends on technology integration, digital tools, interactive learning platforms, and practical learning materials capable of supporting inquiry and problem-solving activities (Pepin et

al., 2022). Many schools, particularly in developing countries, continue to experience shortages of computers, internet facilities, instructional materials, and technological support required for effective competency-based learning and assessment. Mathematics teachers may therefore find it difficult to organize practical and technology-supported assessment activities capable of improving learners' competencies and engagement.

Time constraints and curriculum overload also constitute important challenges affecting competency-focused evaluation in mathematics. Competency-based assessment often requires extended classroom interaction, project supervision, collaborative activities, reflective learning, and continuous feedback processes. Niss and Højgaard (2019) noted that mathematics teachers frequently experience pressure to complete extensive curriculum content within limited instructional periods, thereby reducing opportunities for practical assessment and deeper learner engagement. Teachers may consequently focus more on syllabus coverage and examination preparation rather than on competency development and authentic learning experiences.

Resistance to educational change equally affects the successful implementation of competency-focused evaluation. Learners, parents, teachers, and educational administrators accustomed to traditional examination systems may perceive competency-based approaches as unfamiliar, demanding, or difficult to measure objectively. Concerns regarding grading consistency, reliability, and comparability of assessment outcomes may further discourage widespread acceptance of competency-focused evaluation practices (Mulder, 2017). Mathematics education in the twenty-first century therefore requires adequate teacher training, improved infrastructure, supportive educational policies, and continuous professional development to address the challenges associated with effective implementation of competency-focused evaluation.

Strategies for Effective Implementation

Effective implementation of competency-focused evaluation in mathematics education requires deliberate educational reforms, adequate instructional support, teacher preparedness, and learner-centered classroom practices capable of promoting meaningful learning experiences. Educational systems transitioning from traditional objective-focused evaluation must ensure that teachers, learners, curriculum planners, and administrators clearly understand the principles and goals of competency-based assessment. Competency-focused evaluation emphasizes learners' ability to apply mathematical knowledge practically, solve real-life problems, think critically, collaborate effectively, and demonstrate creativity in different contexts (Levine & Patrick, 2019). Successful implementation therefore depends on strategies capable of aligning instructional practices, curriculum expectations, and assessment procedures with contemporary educational demands.

Teacher professional development remains one of the most important strategies for effective implementation of competency-focused evaluation in mathematics. Many mathematics teachers were trained within traditional examination-oriented systems and may therefore require continuous training on innovative instructional methods, learner-centered strategies, project-based learning, and authentic assessment practices. Darling-Hammond and Oakes (2021) explained that teachers function more effectively when they receive adequate professional support capable of strengthening instructional competence and assessment literacy. Workshops, seminars, mentoring programs, collaborative learning communities, and in-service training opportunities can help mathematics teachers acquire the skills needed for implementing competency-based instruction and evaluation successfully.

Curriculum restructuring and alignment also play essential roles in supporting competency-focused evaluation. Mathematics curricula should clearly define expected competencies, practical learning outcomes, and authentic assessment procedures that encourage application of knowledge in real-life situations. Brookhart (2017) noted that effective assessment systems require alignment between instructional objectives, classroom activities, and evaluation practices. Mathematics instruction should therefore incorporate investigations, modelling activities, collaborative tasks, reflective learning, and practical projects capable of promoting conceptual understanding and analytical reasoning. Curriculum content should also allow sufficient flexibility for inquiry, creativity, and learner participation rather than focusing excessively on syllabus completion and examination preparation.

Provision of adequate instructional resources and technological infrastructure further strengthens effective implementation of competency-focused evaluation. Contemporary mathematics education increasingly depends on digital technologies such as spreadsheets, graphing software, simulations, online learning platforms, and interactive educational applications capable of supporting practical learning experiences (Pepin et al., 2022). Schools and educational authorities therefore need to provide computers, internet access, instructional materials, mathematical tools, and supportive learning environments capable of encouraging technology-supported teaching and assessment. Availability of such resources enables mathematics teachers to organize projects, investigations, collaborative activities, and authentic problem-solving tasks that improve learners' competencies and engagement.

Continuous assessment and timely feedback also constitute important strategies for effective implementation of competency-focused evaluation. Learners benefit significantly when teachers regularly monitor progress, identify learning difficulties, and provide constructive guidance capable of improving understanding and performance. Niss and Højgaard (2019) maintained that effective

mathematics assessment should emphasize reasoning, interpretation, communication, and reflective participation rather than simple memorization of formulas. Mathematics teachers should therefore adopt formative assessment practices such as classroom discussions, peer assessment, reflective exercises, portfolios, and practical activities capable of supporting continuous improvement and deeper learning.

Collaboration among educational stakeholders equally contributes to successful implementation of competency-focused evaluation. Educational policymakers, school administrators, parents, curriculum developers, and teachers need to work together in supporting educational reforms and creating awareness regarding the benefits of competency-based learning and assessment. Resistance to change can be reduced when stakeholders understand the relevance of competency-focused evaluation to modern workplace demands and technological advancement. OECD (2019) emphasized that contemporary educational systems should prepare learners for lifelong learning, adaptability, innovation, and participation in knowledge economies. Mathematics education in the twenty-first century therefore requires coordinated implementation strategies capable of promoting practical competence, critical thinking, creativity, and sustainable educational development.

Future Directions for Mathematics Education in the 21st Century

Future directions for mathematics education in the twenty-first century continue to focus on developing learners who possess critical thinking, creativity, adaptability, technological competence, and practical problem-solving abilities required for participation in rapidly changing global societies. Educational systems across the world increasingly recognize that mathematics education should extend beyond memorization of formulas and procedural accuracy toward deeper conceptual understanding and application of knowledge in authentic situations. Contemporary societies driven by science, technology, artificial intelligence, engineering, and data analytics now require learners who can analyze information critically, interpret data effectively, and solve complex problems creatively (OECD, 2019). Mathematics education is therefore expected to become more learner-centered, technology-driven, and competency-focused in the coming years.

Technology integration is likely to remain one of the most important future directions for mathematics education. Pepin et al. (2022) explained that digital technologies such as virtual simulations, artificial intelligence tools, educational software, graphing applications, and online collaborative platforms continue to transform mathematics teaching and learning experiences. Future mathematics classrooms are expected to utilize advanced technological resources capable of supporting personalized learning, interactive instruction, and real-time assessment. Learners may

increasingly engage with virtual mathematical environments, digital modelling activities, coding exercises, and data analysis tasks that strengthen analytical reasoning and innovation.

Competency-focused instruction and assessment will also continue to shape future mathematics education. Niss and Højgaard (2019) maintained that contemporary mathematics learning should emphasize communication, reasoning, modelling, inquiry, creativity, and practical application of knowledge rather than dependence on examination-oriented memorization. Mathematics assessment practices are therefore expected to move further toward projects, portfolios, collaborative tasks, simulations, and performance-based activities capable of measuring transferable competencies and authentic learning outcomes. Such developments will better prepare learners for modern workplaces and technologically advanced societies.

Darling-Hammond et al. (2020) noted that future mathematics education will increasingly encourage collaborative learning, interdisciplinary instruction, and learner participation in solving real-world problems connected to science, engineering, finance, health, and environmental sustainability. Teachers will consequently function more as facilitators guiding learners through inquiry, experimentation, and reflective learning experiences. Mathematics curricula may also become more flexible and inclusive to accommodate diverse learning needs, cultural contexts, and emerging global challenges. Continuous teacher professional development will remain essential for sustaining these educational transformations because teachers require updated instructional competencies and technological skills capable of supporting innovative classroom practices. Mathematics education in the twenty-first century therefore points toward a future where learning becomes more practical, interactive, technologically integrated, and competency-oriented for sustainable societal development.

Conclusion

The shift from objective-focused evaluation to competency-focused evaluation represents an important transformation in contemporary mathematics education. Traditional assessment practices that emphasized memorization, procedural accuracy, and examination performance are increasingly becoming insufficient for preparing learners to function effectively in technologically driven and knowledge-based societies. Modern mathematics education now requires learners who can think critically, solve practical problems, communicate ideas clearly, collaborate with others, and apply mathematical knowledge meaningfully in real-life situations. Competency-focused evaluation therefore provides broader opportunities for improving conceptual understanding, creativity, innovation, and learner participation within mathematics classrooms. Contemporary instructional and assessment practices increasingly encourage learner-centered teaching approaches, integration

of technology, inquiry-based learning, collaborative activities, and authentic problem-solving experiences capable of strengthening mathematical competencies. Such developments have significant implications for teachers, learners, curriculum planners, and educational policymakers because successful implementation requires adequate teacher preparation, supportive educational policies, technological infrastructure, and continuous professional development. Challenges associated with competency-focused evaluation remain evident in areas such as large class size, limited instructional resources, resistance to change, and inadequate teacher training. Mathematics education in the twenty-first century therefore requires continuous educational reforms and innovative assessment practices capable of producing learners who are adaptable, creative, analytically minded, and adequately prepared for contemporary societal and workplace demands.

Suggestions

Based on the foregoing discussions, the following suggestions are put forward:

1. Mathematics teachers should adopt learner-centered instructional and assessment strategies such as projects, investigations, collaborative learning, practical problem-solving activities, and performance-based tasks capable of improving learners' critical thinking, creativity, and application of mathematical knowledge in real-life situations.
2. Educational authorities and school administrators should organize continuous professional development programmes, workshops, seminars, and training opportunities to equip mathematics teachers with modern competencies required for effective implementation of competency-focused evaluation practices.
3. Curriculum planners and policymakers should redesign mathematics curricula to emphasize practical competencies, technological integration, inquiry-based learning, and authentic assessment approaches that align with twenty-first-century educational and workplace demands.
4. Governments and educational institutions should provide adequate instructional resources, digital technologies, internet facilities, mathematical tools, and supportive learning environments capable of enhancing competency-focused teaching, learning, and assessment in mathematics classrooms.

5. Mathematics teachers should regularly provide formative assessment and constructive feedback through classroom interaction, reflective exercises, peer assessment, portfolios, and continuous evaluation practices capable of helping learners improve conceptual understanding, confidence, and independent problem-solving abilities.

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