



Enhancing Primary Pupils' Problem-Solving Skills Through the Use of Information and Communication Technology in Rivers State, Nigeria

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Abstract

In today's fast-changing world, problem-solving is an essential skill for pupils to master. However, traditional teaching methods are no longer sufficient in providing pupils with the opportunities they need to develop and enhance this skill. This paper, therefore, examines the integration of Information and Communication Technology (ICT) as the key to enhancing pupils' problem-solving skills. It also examines the benefits of educational software, such as simulations, collaborative tools, and gamified learning platforms, in providing interactive, engaging, and collaborative learning experiences that foster critical thinking, creativity, and teamwork as essential problem-solving skills. This paper also notes the challenges faced by teachers and pupils that could hinder the effective use of ICT in primary schools. For teachers, these challenges include a lack of clear instruction and guidance, among others. For pupils, they may include a rigid mindset and fear of failure, among others. The paper concludes that ICT is a veritable educational tool for building pupils' problem-solving skills and preparing them for the demands of the 21st century. Therefore, it recommends, among others, that policymakers, school administrators, and educators in primary schools in Rivers State should prioritise the integration of ICT in classroom instruction in order to empower pupils with the competences they need to succeed in this rapidly changing world.

Keywords: Pupils', Problem-Solving, Skills, ICT, Primary Education

Introduction

All over the world, primary education is the foundation on which the educational system stands, covering a period of six years and meeting the needs of pupils aged 6-11+. According to the Nigeria Policy on Education, the objectives of primary education include, among other things, developing in the child the ability to read, write and communicate effectively, laying a solid foundation for scientific and reflective thinking, and developing manipulative skills and creative abilities. The objective of developing reflective thinking and creativity is closely related to problem-solving skills at the primary level. In the school setting, pupils experience problems from time to time, some of which are difficult, while others require little effort to solve. There is no lack of problems in the classroom setting or during the learning process, including difficulty with the task at hand and problems with fellow classmates. Whatever the problem, it needs to be handled in a way that produces a solution. Doing so is called problem-solving. Problem-solving is the ability to resolve complicated issues using critical thinking and creativity, and the planned, purposeful decision-making needed to carry out one's goal. It is a conscious effort made by pupils to remove an obstacle that blocks the accomplishment of a task and the achievement of one's goal. Similarly, Mehadi (2019) defined problem-solving as a process that involves planned observation and careful reasoning in order to find a suitable solution or a way of reaching the desired objective. The ability to find a solution to a problem requires skills. These skills are known as problem-solving skills. Kwangmuang et al. (2021) describe problem-solving skills as tools used for dealing with challenging situations in a flexible way that strengthens adaptive and productive behaviour. In a similar vein, Zoe (2023) viewed problem-solving skills as competences used to recognise problems, brainstorm, infer solutions and implement the best option.

From these definitions, therefore, problem-solving skills can be said to be the ability or competencies which pupils possess that enable them to identify the nature of a problem, dissect it, and create a workable plan of action to properly

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deal with the difficulty to achieve the desired goal. Effective problem-solving involves several key components that contribute to finding solutions and desired outcomes. These components include:

- Identifying the problem: This means having a clear understanding and defining the nature of the problem. This helps ensure the root cause is addressed, leading to an effective solution.
- Analysing information: Analysing information involves careful observation, consultation and research in order to gather relevant data and get a deeper understanding of the problem. This helps pupils develop workable strategies.
- Generating solutions: This requires brainstorming and critical thinking in order to come up with multiple alternative ideas or approaches in handling the identified problem. This allows creativity, outside-the-box thinking, innovation, and exploration of different perspectives, increasing the chance of finding an effective solution.
- Evaluating options: This involves assessing the strengths and weaknesses, the workability and the potential outcome of each alternative generated. This helps select the most viable and sustainable solution.
- Implementing the best solution: This requires that the selected idea is transferred into actual action toward solving the problem and achieving the desired goal.

Problem-solving skills encompass critical thinking, creativity/innovation, collaboration, decision-making, among others.

Critical Thinking: Critical thinking is a fundamental skill. Heard et al. (2020) opined that it is the ability to assimilate information in such a way that enables pupils to put it to use in making informed decisions and providing effective solutions to problems. In other words, it helps pupils break down a problem or task on hand so as to have a clear picture of the problem for the purpose of creating new ideas to solve it. The capacity to think clearly and rationally about what to do or believe is crucial in problem solving. Pupils engage in critical thinking when they examine, appraise, and interpret information, and use it creatively to generate alternatives to solve a problem. Critical thinking allows pupils to use information based on observed facts and logical reasoning rather than just accepting information as presented. Pupils who acquire this skill are generally reasonable, logical, and sensible in the way they handle school tasks and their personal problems. Critical thinking fosters curiosity and inquiry, leading to the investigation of information, attention to detail, and weighing benefits and drawbacks. It builds self-awareness and confidence in pupils. This is so because critical thinking enables pupils to reflect on their own viewpoint about a problem, thus helping them make sense of a situation based on their own knowledge and opinion (Tilak et al., 2022).

Creative Thinking: Creative thinking is the ability to come up with unique, original solutions. It is a way of looking at a problem or a solution from a new perspective. Lucas (2022) defines creative thinking as the capacity to produce different kinds of ideas, combine ideas in an unusual way, and make logical connections in order to come up with new possibilities that have the potential to solve a problem. It means 'thinking outside the box.' In a similar vein, Lubart and Thornhill-miller (2020) defines creative thinking as a mental process that involves creating new, original and useful ideas to solve a problem. Also, Brwa and Ramdanel (2022) asserts that thinking creatively involves the capacity to think in a practicable and open-minded way, in order to discover new ways of handling a problem and finding solutions. In the classroom, creative thinking encourages pupils to use different approaches to solve a problem, to examine multiple viewpoints, and to come up with new solutions. It enables pupils to apply their imagination in order to produce ideas, question assumptions, try out alternatives, and appraise their own thoughts and those of their peers. It also helps pupils learn to investigate, appraise information, and connect different parts of a problem in a logical and reasonable way in order to come up with new ideas. In addition, creative thinking promotes collaboration as pupils communicate, work together and share ideas to generate solutions to a common problem. In fact, the benefits of creative thinking cannot be exhausted here. But suffice it to say that it helps to prepare pupils for success in this 21st century.

Collaboration: Collaboration means working with another person or group to achieve a common goal. Stout (2021) describes collaboration as a mutual action that involves sharing ideas, and responsibilities to solve a problem together. It is an interactive process that pulls together knowledge, responsibility, skills, and experiences to achieve a set goal or solve a problem. (Cagatan & Quirap, 2024) As pupils collaborate, they contribute to group knowledge by communicating, asking questions, seeking clarifications, responding to each other's questions, appraising each other's ideas, all with a view to coming up with the best possible solution to a problem or task. Collaboration in and outside the classroom helps pupils to enhance other skills such as problem-solving, critical and creative thinking, among others. It promotes pupils' self-esteem, and boosts their confidence as they see how their own contribution to the group

makes positive impact. It also fosters communication/interaction between group members. Collaboration heightens pupils' sense of responsibility as they come to realize that they must contribute toward to task on hand. In line with these stated benefits, Agarwal (2026) asserts that collaboration helps pupils accommodate various types of learners, fosters better learning experiences for pupils, and helps them develop their leadership skills.

Decision Making: Decision making is an intellectual process involving careful evaluation of alternatives, deliberation, and the selection of the best option. Linde (2021) describes decision making as choosing the right action at the right time. Mahaputra (2022) opines that decision making is the process of making a choice from among several possible options. Decision making precedes implementation; that is, before any action is carried out, a decision or choice of solution must first be reached. For effective decision making, there are steps to be followed. These include identifying the problem, gathering information about the problem, thinking critically and creatively, identifying and generating several possible paths of action, using imagination to construct new ways of acting, and evaluating alternatives, among others. After taking these steps and choosing an option, review the chosen option to see whether it has resolved the problem. If not, repeat the steps above. By following these steps, pupils increase the likelihood of arriving at the best decision. Decision making is important for pupils because it helps them cultivate skills that will make them more independent, confident, responsible, and self-reliant regarding their school activities, reduce anxiety, and keep them in control of their lives. It encourages exploration and strengthens their moral and other values. Furthermore, it helps pupils make their own choices and bear the consequences. But above all, decision making helps pupils solve problems.

Problem-solving Skills: Its Relevance

One essence of primary education is to teach pupils how to think more productively, especially when dealing with problems at school, outside school, or in their personal lives. As pupils grow into adults, they come to understand that not all problems have the same solutions. Problem-solving skills can help to fortify pupils to face up to challenges. Problem-solving skills instil curiosity, encourage pupils to ask questions, keep them open to new ideas, and help them see that there are many sides or perspectives to a problem and many creative solutions to any problem. A study carried out by Marshall (2022) revealed that problem-solving instils confidence in pupils. As pupils tackle problems, they are unfamiliar with, or do not know the answers to, in a subject area, even in personal matters, they develop self-confidence in their ability to apply the same problem-solving skills they used in other subject areas, outside school or in their day-to-day lives. Since, in most cases, problem-solving involves sharing ideas with peers to solve a particular problem or achieve a set goal, it is right, therefore, to say that problem-solving skills help pupils acquire important interpersonal skills such as teamwork, communication skills, a sense of responsibility, respect for other people's opinions, among others. A study carried out in Ilorin, Nigeria, by Adeoye (2023) showed that problem-solving fosters creativity/innovation, which enables pupils to think outside the box and try other approaches from different angles to solve complex problems. Pupils with good problem-solving skills are proactive in understanding the root cause of a problem. In another study carried out in New Delhi, India, by Kapur (2020), titled "Problem Solving Skills: Essential skill in providing solution to personal and professional problems", it was revealed that problem-solving skills help pupils make better and wiser decisions, especially because they consider a wide range of alternatives before deciding on the right one.

Challenges of Pupils' Problem-solving Skills

Pupils face challenges in applying problem-solving skills in various situations, which has led to poor decision-making, poor academic performance, and limited prospects for future success. Identifying these challenges and possible solutions will help pupils enhance their problem-solving skills, which they need to thrive in this 21st century. Challenges that hinder the enhancement of problem-solving skills are two-dimensional, involving both teachers and pupils. Challenges that come from teachers stem from ineffective instructional practices. Teachers play a crucial role in facilitating and enhancing pupils' problem-solving skills. Hence, ineffective instructional practices, such as a lack of clear instruction and guidance, insufficient encouragement, and limited opportunities for practice, among others, can make it difficult for pupils to apply and enhance problem-solving abilities. When teachers fail to provide clear instructions and guidance on how to tackle a problem, this can lead to confusion, frustration, and even pupils giving up on finding a solution.

Insufficient feedback and encouragement from the teacher can dampen pupils' zeal and effort to solve a problem. Imagine a pupil struggling to solve a mathematics problem, and the teacher provides only negative feedback and name-calling, such as "bighead", "coconut head", "fool", and so forth, without offering any suggestions or

encouragement. This, of course, will hinder pupils from making progress in solving a problem. Limited opportunities to practise is also a challenge that hinders the enhancement of problem-solving skills. Without regular practice, pupils may not develop the confidence they need to solve a problem effectively. Pupils need opportunities to engage in real and meaningful problem-solving activities that challenge them to think critically and innovatively. (Rusmin et al, 2024)

On the other hand, challenges to pupils' problem-solving skills can also stem from the pupils themselves. For them, a rigid mindset, fear of failure, and emotional challenges, among others, can pose serious obstacles. A rigid mindset leads pupils to rely only on a particular solution that worked for them in the past to solve every problem that comes their way. They are blind to other approaches to solving a problem. A rigid mindset limits pupils' viewpoint, and as a result, they do not consider other alternatives or take other people's opinions into account. Emotional challenges such as anxiety or being overwhelmed by a problem or task on hand can affect pupils' clear thinking, creativity, and judgment. Fear of making mistakes and failing is another challenge that hinders pupils' problem-solving skills. Buttressing this point, Junuthula (2022) asserts that this kind of fear can prevent pupils from taking reasonable risks and trying new alternatives and approaches.

For pupils to think in this dynamic world, they must possess the skills to solve problems in order to meet the demands and challenges of the 21st century. True, problem-solving skills are taught in our primary schools, but the traditional teacher-centred approach is insufficient in this age and time. Pupils these days prefer an interactive method of teaching and learning, which encourages their engagement, rather than passive learning. For instance, a study carried out by Global Research and Insight (2018) shows that more than 50% of these pupils prefer to use multi-media or other innovative forms of learning. Hence the need to try other innovative strategies. One of the more popular strategies is the use of Information and Communication Technology (ICT).

Information and communication technology (ICT) refers to the use of technological tools and resources to transmit, create, store, share or exchange information. According to Indeed Editorial (2026), it is an umbrella term for any communication device or application that can be used to access and transmit information via voice, text, or video. ICT tools and resources include computer networks, hardware and software, radio, television, mobile phones, satellite systems, and so on (Ozdamu & Ozdal, 2015).

In the field of education, ICT has significantly transformed the way teachers teach and learners learn, especially in the classroom. The use of ICT can benefit both teachers and pupils. It helps teachers to be more effective in instructional delivery, to reduce the amount of paperwork, and to reduce excessive talking (verbalism), among other things. For pupils, it makes learning fun and enjoyable, thereby improving engagement and retention. It also helps them have more access to information on a particular subject. With ICT, pupils can develop problem-solving skills more effectively.

ICT tools and resources provide pupils with more interactive, engaging, and real-world experiences that enhance problem-solving skills, critical thinking and creativity. ICT tools such as educational software, online platforms and mobile apps enable pupils to explore, experiment and innovate. This paper explores the potential of ICT to enhance pupils' problem-solving skills. To do so, three ICT resources and their benefits will be briefly discussed.

Role of ICT in Enhancing Problem-Solving Skills

The educational system is moving towards the integration of information and communication technology (ICT) in classrooms. This is because ICT has the potential to make lesson delivery and learning more interactive and engaging. ICT also has the potential to enhance essential 21st-century skills, such as problem-solving. It offers a wide range of tools and platforms that can foster creativity, critical and reflective thinking, and collaboration, all of which are integral to problem-solving among pupils in primary education. Educational software, such as simulations, online collaboration tools, and gamified learning platforms, are examples of dynamic resources offered by ICT. These tools and resources create an interactive environment in which pupils are more motivated and involved in problem-solving.

Interactive Simulations and Problem-Solving Skills

Interactive simulations are computer programs or models that mimic real-life situations. Putri and Sofyan (2020) assert that they provide a digital environment where pupils can interact with models and observe changes in the simulated system. To Adeola et al. (2023), they are a re-enactment of real-world situations in a constrained environment.

4 | Cite this article as:

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Interactive simulations are used in education to bridge the gap between what is taught (content) and actual situations. Simulations create a “world” where pupils can manipulate work through challenges or tasks they can respond to, and work with their peers to achieve set goals. There are different types of interactive simulation that can be used, depending on the objective. For example, we have role-play simulation, subject-based simulation, adventure simulation (field trip), among others. Role-play simulation can be about any subject matter and situation, such as hospital, farm, school, restaurant, bank, shop, community, environment, among others. Pupils can be assigned roles in a simulated environment where they act. For example, pupils can play the role of a shop owner, salesperson, or customer. Using this simulation tool, they can set up their own shop, choose a name for the shop, select a location (whether along a street or in a general market), design the shop, decide what to sell, budget how much will be used to set up the shop, how many people to employ, and how much to pay each staff member, among others. All these steps require critical thinking, creativity, decision-making, and collaboration; essential skills encompassed in problem-solving. Shop simulation can help pupils gain a better understanding of concepts such as buying and selling and money changing hands, which are basic concepts in business, commerce, and economics. Laying credence to this, Hsu and Wu (2023) states that shop simulation improves pupils’ critical thinking and problem-solving abilities; it fosters pupils’ confidence and lays a foundation for their understanding of basic concepts and self-esteem.

Subject-based simulation can be used to enhance understanding of different subject areas, such as mathematics, basic science, English language, social studies and others. Simulation is used to replicate real-world scenarios within a subject area to help learn and understand difficult topics and make connections, using virtual models and simulated environments to interact with. Some subject-based simulation platforms, including matific, duolong, PHET interactive, among others, can be used to enhance pupils’ problem-solving skills. For example, matific is an online platform for maths education that helps pupils learn and practise maths concepts in a virtual environment. It also allows pupils to visualise, explore, and understand difficult maths concepts in a more interactive, enjoyable and practical way. Virtual maths such as geometry, fractions, measurement, and basic arithmetic operations can be simulated for pupils to work with. The matific platform has tools for virtual manipulation, such as live blocks, shapes, graphs, among others. For increased engagement and learning experiences, opportunities for teamwork, sharing ideas, and feedback (collaboration) exist, helping each pupil to assess their own strengths and weaknesses, areas for improvement, among others.

Rahman (2024) asserts that the Matific simulation has the potential to improve pupils’ understanding of mathematical concepts and problem-solving skills. When problems are presented to pupils, they are required to analyse them critically to identify patterns and make connections. Sometimes, pupils need to work as a team to generate different options from which to decide on the best solution to a problem. Field trip simulations allow pupils to visit, explore and learn about particular places and things in a virtual environment that mimics the real-world location, such as museums, zoos, amusement or historic sites, parks, factory seaports, airports, among others. To Chen and Zhang (2024), simulated field trips allow pupils to take an educational journey without learning in the classroom. Platforms such as Google Expeditions, Scavify, and Scholastic Field Trips can be used to simulate field trips to places of interest. Virtual field trips can enhance pupils’ problem-solving skills, as during such trips they are required to think critically about the information they have gathered, analyse available data, identify patterns, collaborate, and make decisions to solve a given problem. Among the many benefits of using interactive simulation in primary education is the enhancement of problem-solving skills. When pupils are presented with a task, a simulation environment gives them the opportunity to think critically, analyse the situation, come up with different alternatives to solving the problem, evaluate the options, and then decide on the best option that will allow them to successfully carry out the task.

When simulation is used, pupils are allowed to actively learn by interacting with the presentation, thereby enabling them to practise problem-solving and enhancing this skill. As pupils frequently solve problems using interactive simulations, they develop and refine effective strategies to find solutions. Practising complex problems within the simulated environment builds confidence in solving real-world problems (Falconer, 2019). Supporting this view, Ansaf and Jaksic (2020) assert that interactive simulation has the potential to improve pupils’ problem-solving skills, rather than simply providing solutions. Therefore, as pupils regularly engage with interactive simulation, they are presented with situations that allow them to analyse, think critically, generate options, evaluate and decide which to use, thus sharpening these skills.

Online Collaborative Tools and Problem-Solving Skills

Collaboration simply means working with another person or group of people to achieve a common goal. Therefore, online collaboration tools are technologies that help people work together to achieve a set objective. Andrew and Brush (2024) describe online collaborative tools as software or applications that empower pupils to share their knowledge and experiences as they work together on a common task or project, regardless of their physical location. These tools offer pupils opportunities for real-time messaging, visual brainstorming, group charts, file sharing, and voice and video conferencing for one-on-one communication. Examples of these tools include Zoom, Slack, Asana, Trello, Think-Pair-Share, and Miro, among others.

The main aim of online collaboration tools is to help groups of pupils accomplish their common goal. Pupils can make use of these tools to enhance their problem-solving skills by:

- Fostering teamwork and communication. This feature encourages pupils to work together by expressing ideas, actively listening to each other's opinions, and quickly discussing and clarifying the task or problem at hand.
- Promoting critical thinking and creativity. Pupils can use this feature to analyse a task together as a team. Since a team includes people with different skills and knowledge, it becomes easier to analyse and think critically about a problem from different perspectives, bringing together novel ideas that can be evaluated to reach a decision for implementation.
- Brainstorming and visual representation of ideas. With a tool like Zoom, pupils can see each other from different locations. This application allows pupils to visually connect ideas and generate possible solutions to a task. For instance, in demonstrating an idea, these platforms allow other group members to see how facts are presented. This helps facilitate better understanding of a task. It also helps group members make informed decisions about the alternatives generated to achieve the set goal. Lamina (2020) opined that this type of collaboration fosters pupils' problem-solving skills.

In this paper, we will discuss only two of these, namely, Zoom and Miro.

Zoom

Zoom is a video conferencing platform that allows teachers and pupils to hold classes, meetings, and other events online synchronously, via laptop or cell phone. Pupils can use Zoom to collaborate on projects, assignments, or other tasks outside the classroom. To access the platform, one must create an account and then log in with the required details. Some features of Zoom include,

Create meeting: This feature lets users schedule meetings with a time, date, and duration.

Join meeting: The join meeting feature is used to invite participants to the meeting, either by using a link or by entering the meeting password and ID.

Video/sound: Allows participants to see each other and hear when each person is speaking, among other features.

Breakout rooms are another tool that helps users (teachers and pupils) collaborate in small groups, where members can work on a common task and propose solutions as a team.

Chart tools: are used to ease communication among pupils, letting them share ideas, ask questions, get clarification, and provide feedback at the right time.

Zoom polling: is used to gather feedback when questions are asked. In other words, if a question is asked, this tool can be used to get the number of respondents. Using this tool, pupils must think critically and analyse the data presented before deciding on a response to a given problem or task (Robinson, 2021). Zoom provides a range of collaboration tools that can help enhance pupils' problem-solving skills, such as screen sharing (used to present puzzles, brain teasers, presentations, and other documents), allowing pupils to think critically to clearly understand and evaluate a problem. Overall, Zoom features and tools can enhance pupils' critical thinking, collaboration, communication, and decision-making skills needed to succeed in the 21st century.

Miro

Miro is an online collaborative whiteboard platform that pupils can use in and outside the classroom. Lorts (2022) defines Miro as a virtual online collaborative tool that allows pupils to work together as a team even from distant places. With Miro, pupils can brainstorm, mind-map, share and build ideas. Miro has many features that can enable pupils to cooperate successfully on projects and assignments, designing and idea sharing. Some of these are video charts, a virtual whiteboard (where pupils can add notes, images, emojis, and videos), and integration with other collaboration platforms such as Google Drive, Slack, among others, for the purpose of sharing resources. Miro also

provides real-time feedback, which helps pupils know progress made on the assigned problem, and improvements to be made (khairAllah, 2023). Since Miro provides a platform for pupils to work together as a team with all attendant benefits, it truly can enhance collaboration and pupils' problem-solving skills. When a problem is presented using this platform, pupils will think critically as they analyze and evaluate information on hand in order to have clear picture of what is required. As team members come up with fresh ideas and different approaches to solving a problem, they enhance their creativity. Also, as a group, pupils would have to decide which approach or idea will best solve the problem.

Gamified Learning and Problem-Solving Skills

The use of game elements or processes in teaching and learning is called gamified teaching and learning. Eduaide (2023) describes gamification as a teaching tool used to bring about learning through the use of game methods and game-based thinking. Kim noted that when using a gamified learning platform, pupils are engaged in activities that require game components, such as overcoming challenges and earning points for completing a task, among others. Gamification is not about playing real games, but about using game elements to engage pupils and help them enhance their problem-solving skills. Game elements serve as a motivational force to engage with the task and stay with it to completion. Examples of gamified platforms used to enhance pupils' problem-solving skills include Khan Academy, Math Playground, National Geographic Kids, Puzzle Baron, among others. Khan Academy is an online platform that provides interactive games, activities and videos that help pupils acquire skills in maths, reading, science and socio-emotional learning. The game can be played on the desktop, smartphone, tablet, and other electronic devices that have internet connectivity. A study carried out in Sri Lanka by Weeraratne and Chin (2018) revealed that Khan Academy Kids is an effective way of improving pupils' maths skills and reading. Examples of games on the Khan Academy Kids platform that enhance pupils' problem-solving skills include Math Bingo and the Science Hunt Scavenger Hunt, among others. The Science Hunt Scavenger Hunt is an interactive game created to help pupils explore and learn about science concepts in an enjoyable and engaging way. The objective of the game is to instil in pupils scientific literacy and problem-solving skills. The game also encourages pupils to think innovatively and gain a better understanding of the world around them. This game can be played individually or as a group. To play this game, instructions, rules and the objective are provided to the pupils. There is also a list of challenges or tasks to be completed during the game. These may include identifying an object or image, solving a puzzle or riddle, writing a story or poem, or answering a question, among others. After choosing a challenge or challenges, the game begins and ends at a set time. On completing the challenge, the solution is submitted, and points are awarded to the winning team.

There are variations in how this game is played, but no matter the type, it can enhance pupils' problem-solving skills. This is because when pupils play the science scavenger hunt game, they must first identify the problem that needs a solution. This means that pupils must understand what is required of them. Pupils must think critically as they examine the information presented, identify and make connections between the different parts of the information. They will have to come up with different ideas and ways to solve the problem. They must also decide on the best course of action to take. If the game is played as a group, team members must work together, cooperate and support each other to proffer a solution to the problem. Hence, as pupils play the science scavenger hunt game, they use skills such as critical thinking, creativity, collaboration, and decision-making, which are essential to problem-solving.

Math Playground is an online platform that provides a variety of maths games and puzzles with varying difficulty levels (from easy to complex). It is designed to make learning maths easier and enjoyable. It is geared towards enhancing pupils' problem-solving and mathematical reasoning. Examples of games offered on this platform include the 24 Game, Mathdoku, Math Bingo, among others. These games can be played individually or as a group. For instance, the 24 Game requires players to use basic arithmetic operations such as addition (+), subtraction (-), multiplication (x), and division (÷) to make the number 24 from four given numbers. In describing the 24 Game, Brandclickx (2020) states that pupils are required to figure out how to compute a target number (24) using basic arithmetic operations and a given set of numbers. To start the game, 4 numbers are randomly generated, such as 9, 2, 8, 1. Pupils must add, subtract, divide or multiply to obtain the number 24 from the four given numbers. Each number can only be used once, but all four numbers must be used. Parentheses () can be used to group the numbers during play. For instance, the numbers 9, 2, 8, 1 can be played as $(9 \times 8) \div (2+1) = 72 \div 3 = 24$. While playing the game, pupils may try different approaches or combinations to arrive at the target number 24. The game ends when the allotted time is up or when pupils successfully make the number 24. The 24 Game can enhance pupils' problem-solving skills, as it requires them to think critically about how to combine the numbers to arrive at the target number. Brandclickx (2020) opined that the game allows pupils to try different operations and number combinations to solve the problem,

thereby enhancing their creativity. Pupils also need to analyse the data provided, evaluate it, and make decisions about which will best solve the problem. Hence, the more they play this game, the more they enhance their problem-solving skills.

Game-based learning can enhance problem-solving skills through:

- Engagement and motivation. When problems are presented to pupils on a gamified platform, game elements such as rewards can motivate pupils to persist in finding a solution to the problem. As pupils engage in the process of problem-solving, mistakes are inevitable. Game elements motivate pupils to repeat the process until the solution is found. This process of repeating and staying on the task invariably enhances problem-solving skills.
- Critical thinking and creativity. Gamification encourages learners to analyse the task for better understanding, of the problem, to explore new solutions, and approach the problem from different angles in order to generate innovative ideas.

Gamification learning platforms can be a powerful tool for enhancing problem-solving skills because they provide engaging, interactive learning experiences that encourage pupils to practice, repeat, and refine their options.

So far, the idea of using ICT tools to enhance pupils' problem-solving skills in public primary schools in Rivers State is appealing. However, it is not without its challenges and limitations. One major concern is the lack of infrastructure and resources in many public primary schools in the state. Many schools lack amenities such as electricity, internet connectivity, computers and computer software, making it difficult to implement ICT-based learning programmes. In addition, the cost of procuring and maintaining ICT facilities and services can be very high for most schools, especially those in rural areas. Another challenge is the digital divide between those with access to ICT tools and those without. This has led to a sense of inequality among pupils. Additionally, ICT can sometimes be a distraction and may lead to a lack of focus and attention among pupils, especially where there is no proper supervision. Overall, the researcher submits that ICT has the potential to enhance pupils' problem-solving skills, as it encourages active participation in the learning process and interactive, practical, and collaborative work among pupils. When pupils use ICT tools such as educational games, simulations, among others, they learn how to think critically, try out different solutions, and apply knowledge effectively. Therefore, integrating ICT into classroom instruction can enhance pupils' overall academic performance in primary schools in Rivers State.

Analysis

The paper examines the role of Information and Communication Technology (ICT) in enhancing pupils' problem-solving skills in primary education, particularly in Rivers State. It establishes that problem-solving involves identifying problems, analysing information, generating and evaluating alternatives, and implementing appropriate solutions. These processes depend on critical thinking, creativity, collaboration, and decision-making. The paper further argues that conventional teacher-centred approaches offer insufficient opportunities for pupils to practise these skills, making ICT-supported learning increasingly relevant. Interactive simulations, online collaborative tools, and gamified learning platforms are presented as ICT resources that provide practical, engaging, and interactive learning experiences. Simulations allow pupils to experiment with realistic situations, while collaborative platforms encourage communication, brainstorming, and teamwork. Gamification, meanwhile, motivates pupils to persist with challenging tasks and repeatedly practise problem-solving. However, the analysis recognises that ICT integration is constrained by inadequate electricity, internet connectivity, devices, software, funding, and the digital divide. Teacher-related factors and pupils' rigid mindsets or fear of failure can also limit effective problem-solving.

Discussion

The conversation suggests that ICT can enable a more active, learner-centred approach to developing problem-solving skills among primary school pupils. Rather than merely receiving solutions from teachers, pupils can interact with simulations, collaborate with peers, and engage in educational games that prompt them to analyse problems, generate alternatives, evaluate possibilities, and make decisions. This approach aligns with the paper's view that effective problem-solving requires pupils to combine critical thinking, creativity, collaboration, and decision-making. Examples such as simulations, Zoom, Miro, and gamified platforms demonstrate how technology can connect classroom learning with practical, real-world situations. However, the potential benefits of ICT should not be assumed. Effective implementation requires adequate infrastructure, teacher preparation, supervision, and meaningful opportunities for practice. The paper appropriately identifies poor infrastructure, inadequate resources, high costs, unequal access, and possible distraction as important limitations. Therefore, ICT integration in primary schools in Rivers State should be

supported by teacher training, reliable electricity and internet access, appropriate digital resources, and sustained institutional support. These measures would help ensure that ICT functions not simply as a technological addition to teaching, but as a practical means of developing pupils' problem-solving competencies.

Conclusion

The incorporation of information and communication technology (ICT) in primary education in Rivers State has the potential to significantly enhance pupils' problem-solving skills. This study has shown that ICT educational software, such as interactive simulations, collaborative tools, and gamification learning platforms, provides pupils with interactive and engaging learning experiences that enable them to explore real-world scenarios and enhance their problem-solving skills. These skills include critical thinking, creativity and teamwork. These ultimately prepare pupils for success in the 1st century.

Suggestions

In light of these findings, it is hereby suggested that:

- 1) Policymakers, school heads, and educators in primary schools in Rivers State should prioritise the integration of ICT in primary schools in order to empower pupils with the competences they need to succeed in this rapidly changing world.
- 2) Teachers in primary education should be given regular training and support to enable them to effectively utilise ICT tools and resources to enhance pupils' problem-solving skills.
- 3) ICT devices and educational software packages, internet connectivity, and alternative power supply sources should be provided in public primary schools in Rivers State to enable both teachers and pupils to optimise the benefits of ICT.

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