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Dynamic resonance: unpacking Ghanaian traditional knowledge through proverbs for modern socio-environmental innovation

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Traditional knowledge reflects the essence of a community, embodying its truths and ancestral lineage. Preserving this knowledge is vital for maintaining identity and cultural roots. However, viewing it as the sole marker of ethnic ancestry overlooks other factors, such as genetics and the interplay of beliefs and practises. Beliefs and practises, shaped by cumulative wisdom, represent a dynamic core of traditional knowledge influenced by geography, experiences, cultural encounters, and resource availability. Tradition is not static but evolves with time, adapting to the needs of the era. Thus, it is essential to critically evaluate traditional knowledge within its temporal context to distinguish sustainable practises from those that may hinder progress. This paper examines select traditional knowledge embedded in proverbs from two Ghanaian ethnic cultures, Akan and Ewe, through the lens of 21st-century sustainable practises. The focus is to demonstrate that whilst some traditional knowledge endures, others align with modern skills like creativity, innovation, critical thinking, and collaboration—key to socio-environmental sustainability. The paper begins by appreciating Ghanaian traditional knowledge and its practical applications in daily life. It then presents a selection of proverbs with their interpretations, followed by a critical review guided by 21st-century benchmarks with the aid of ChatGPT 4.0 and Gemini 1.5 pro language modelling Artificial Intelligence (AIs) after authentication of the selected proverbs by language experts who are also vested in Ghanaian proverbs. The analysis highlights the nuanced fabric of traditional knowledge, identifying some proverbs that remain relevant and adaptable for daily usage in educational and industrial organisations to elicit 21st-century competencies. The paper concludes with recommendations for scholarly contributions and educational initiatives grounded in traditional knowledge. These initiatives aim to foster sustainable, innovative practises that meet contemporary needs, bridging cultural heritage and modernity.

KEYWORDS

21st-century skills, Akan, competencies, ewe, proverbs, traditional knowledge

1 Introduction

Ghana is renowned for its vibrant multicultural diversity, where a rich tapestry of ethnicities is unified by shared cultural heritage. This diversity is reflected in a myriad of beliefs, practises, and traditions encapsulated within arts, folklore, and other cultural expressions. Amongst these, proverbs hold a significant place as a form of folklore (Amponsah, 2023), embodying verbal artistic expressions crafted through daily oral communication. These proverbs, often classified as “words of wisdom” (Načičione, 2022), serve as profound tools for logical and critical reasoning. They hold immense potential to shape the thinking, behaviour,

and innovative competencies of individuals and groups (Avoseh, 2012; Al-Azzawi and Salih, 2021).

Ghanaian proverbs, as a subset of traditional knowledge, are not only a repository of ancestral wisdom but also a medium for cultural preservation and societal growth under frameworks such as the National Folklore Act [Collins, 2019; National Folklore Board (NFB) Ghana, n.d.]. Their versatility is evidenced by their adaptation into visual symbols like Akan *adinkra* and Ewe *agama*, which have transcended local use to gain global appeal (Kwabena, 2020). These applications underscore the ongoing relevance of proverbs in bridging cultural traditions with contemporary artistic and scientific innovations. Despite these advancements, the literature reveals a gap in understanding how proverbs retain their relevance in modern contexts, particularly in fostering 21st-century thinking and ingenuity. Whilst there has been significant scholarly effort in documenting the diverse types of proverbs used by ethnic groups across Africa, including Ghana, little has been done to explore their application in educational contexts. For example, Appiah-Sekyere (2016) examines Akan ethics embedded in proverbs and Humanist ethics correlation in terms of advancing moral values in society. He found that Some Akan proverbs promote ethics and positive moral behaviour, arguing that morality is not only typical in religion but also in traditional knowledge. That study, though emphasises ethics and values as particularly pertinent in our technology-driven era where competencies such as critical thinking, creativity, and problem-solving are paramount, it did not specifically focus on analysing a collection of proverbs that advances all the 21st-century skills. Again, the extent to which Ghanaian proverbs are utilised within educational contexts to advance these 21st-century thinking and ingenuity in learners remains underexplored. Whereas these gaps are not the central focus of this paper, it is essential to emphasise that proverbs possess a timeless quality; their wisdom endures as a generational legacy of cultural antiquity. It therefore raises a question which underpins this current study: “Do Ghanaian proverbs corroborate the philosophical constructs of 21st-century thought?” Establishing such a connection would provide a robust foundation for further research into the pedagogical application of these proverbs, particularly their role in fostering 21st-century competencies in learners.

This study, therefore, aims to re-examine selected Ghanaian proverbs within the framework of contemporary socio-cultural and educational needs. Proverbs, with their symbolic and metaphorical richness (Avoseh, 2012; Barone, 2021), possess untapped potential to influence cognitive and behavioural development in learners. In this regard, by investigating the alignment of Akan and Ewe proverbs as the two most populous linguistic groups in Ghana (Statista, 2023)—with the philosophical constructs of 21st-century ideologies, this current study seeks to bridge traditional knowledge with modern pedagogical practises. The findings are expected to contribute to the broader discourse on the role of cultural artefacts such as proverbs in education and innovation. They will not only underscore the relevance of proverbs in preserving identity and cultural heritage but also highlight their utility as instructional tools for nurturing cognitive and behavioural capacities. Furthermore, this exploration could position proverbs as critical catalysts for sustaining industrial

revolutions, thereby enhancing their value in contemporary and future contexts.

2 Brief literature

2.1 Contextualising proverbs as traditional knowledge in socio-environmental education and its implications on 4th industrial revolution

Traditional knowledge serves as an authentic wellspring that delineates the essence of a community, encapsulating its truths of existence and ancestral lineage. In Africa, proverbs have been identified as one of fountains of traditional knowledge that reflects the wisdom of indigenous societies (Owomoyela, 2021). Proverbs, as a form of traditional knowledge, play a critical role in conveying cultural values, social norms, and collective wisdom across generations (Yankah, 1989). They encapsulate the lived experiences and practical wisdom of communities, making them valuable tools for socio-environmental education. By embedding moral lessons and practical advice within culturally resonant narratives, proverbs provide a relatable and impactful means of educating individuals about sustainable practises and community resilience - proverbs therein have the potentials of modifying the behavioural constructs of individuals and society (Yankah, 1989; Owomoyela, 2021; Barone, 2021). It is therefore necessary to revisit our traditional knowledge, contextually aligning their philosophical underpinnings to modern practises. We have a responsibility to add to the knowledge of the ancestors whilst preserving the invaluable once through frequent usage in our daily endeavours.

In the context of socio-environmental education, proverbs offer insights into indigenous knowledge systems that emphasise harmony with nature and sustainable resource management. They can serve as educational tools that bridge the gap between traditional ecological knowledge and modern environmental science, promoting a more holistic understanding of sustainability (Agyekum, 2019). Even as their importance has been greatly established, the use of proverbs in most societies have been restricted to adults or specific functions. In Ghana, proverbs have been often visualised into traditional symbols used for creating various forms of artefacts such as printed cloth, wood carving, or paintings on buildings. For example, the Akan *adinkra* symbols or Ewe *agama* symbols that visually represent proverbial sayings (Kwabena, 2020; Sea, 2022) by the various ethnic groups. Thus, the use of proverbs becomes very relevant in daily endeavours of the people. This opens up the conversations on how these proverbs can be incorporated more in daily communications to impact thinning and behaviours of the masses than just treating them as sacred or concepts reserved for the “wise.”

Whereas societies thrive to make life better in this current 4th Industrial Revolution (4IR) characterised by the fusion of digital, biological, and physical innovations that presents both challenges and opportunities (Zervoudi, 2020; Zoldan, 2021), integrating traditional knowledge into our modern practises would be prudent. Proverbs, as repositories of traditional knowledge, can inform and enhance technological innovations by providing ethical frameworks and sustainability principles rooted in centuries of experience. Key amongst the 21st-century thinking skills and competencies that have

been identified by some experts (Geisinger, 2016; Hummel and Hummel, 2024) include;

- Critical thinking and problem-solving, Creativity and innovation
- Communication and collaboration
- Information literacy
- Media literacy
- Technology literacy
- Flexibility and adaptability
- Initiative and self-direction
- Social and cross-cultural interaction
- Productivity and accountability
- Leadership
- Global citizenship
- Sustainability
- Financial literacy
- Health literacy
- Learning to learn (metacognition)

Incorporating proverbs into 4IR-driven education can foster critical thinking, creativity, and ethical considerations amongst learners, which can be achieved through the agility of teachers (Quarshie et al., 2022). The application of traditional knowledge in contemporary contexts involves integrating this wisdom with modern practises to enhance socio-environmental sustainability. Traditional practises that align with sustainable development goals can offer valuable insights into resource management, community resilience, and environmental stewardship (Nepal, 2024). By identifying and promoting such practises, we can foster a more sustainable and holistic approach to development.

3 Methods

This study aimed to delineate the Indigenous and traditional knowledge embedded within the philosophical constructs of selected Ewe and Akan proverbs as two most spoken ethnic languages in Ghana (Statista, 2023). In this study, we espoused the explorative design in qualitative research approach for a thematic textual content analysis of the selected proverbs (McKee, 2003; Morsanyi and Stamenković, 2021). These proverbs were identified through Boolean search in which is a type of search technique allows for use of keywords and logical operators to limit, broaden or define the scope of the search from internet database (an example of keyword combination used for the search is, *Akan proverbs and meaning.pdf*). First, we randomly collected a total 240 proverbs for each language enlisted in referenced journals and local blogs such as Kambon and Dzahene-Quarshie, (2017), Diabah and Amfo (2018), Dogbey and Sapaty (2019), Kwabena (2020) and Sea (2023). The pull of the collected data was cleaned to remove duplicates in MICROSOFT EXCEL. These proverbs with their literal meanings were examined critically out of which 41 were shortlisted given their relativity with human socio-environmental contexts. Next, the proverbs and their literal meanings from these sources were assembled in a single document for advanced selection of a total of 41 (19 Ewe and 22 Akan). The criteria for selection focused on those within the scope of societal and environmental dynamics relating to humans based on their literal meanings. In doing this, the focus of the study which has to do with the extent of how the proverbs support

21st-century philosophical constructs in education and industry remained the principal factor throughout the selection. To wit, any of the proverbs relating negatively or positively to the 21st-century skills and competencies constituted the total sample for critical and contextual analysis in this study. Regarding credibility, the selected proverbs were further validated by two language experts and elders with profound knowledge of proverbs in each of the ethnic groups, respectively, to establish their authenticity and meaning thereby enhancing the credibility of the deductive analysis. Following this validation, both the proverbs in their ethnic languages and their meanings were explored through language model AIs (Chat GPT 4.0 and Gemini 1.5 pro) to gain further insights into their alignment or contradictive correlations with 21st-century philosophical underpinnings and practises in education and industry (see Tables 1, 2). An example of the prompts used include: *“Justify why this proverb aligns or contrasts 21st-century competencies: [The PROVERB as written in Akan or Ewe and its literal meaning as written in English].”* The initial insights from both AIs were then critically compared, interrogated for further analysis using a critical content analysis approach, akin to the method employed by Santoso et al. (2024), to advance arguments of deductively (Santoso et al., 2024; Kim et al., 2020). This analysis included logical justifications through textual dialogue on how the selected proverbs, especially those supporting 21st-century competencies and philosophies, as traditional knowledge, can be promoted and used in educational or organisational practises.

4 Results and discussions

4.1 Analysis of selected Ghanaian proverbs through the lens of 21st century skills and the 4th industrial revolution

In this section we present a critical analysis of the meanings and philosophical contexts of selected Ghanaian proverbs through the lens of 21st-century thinking and skills sets for the 4th Industrial Revolution (Industry 4.0), categorising them as promoting or not promoting innovative thinking. As posited earlier, the goal is to highlight their usability in teaching and learning, organisational practises and everyday life application to promote problem-solving in society. For each of the ethnic groups selected for this study, the proverbs collected in relation with the scope of societal and environmental dynamics relating to humans based on their literal meanings were recategorised into two groups. The first group contains proverbs and their meaning (literal and actual) that contextually align with 2st-century philosophies (Table 1) whereas the other group are those that contrast 21st-century competencies and philosophies (Table 2). Also, included in the table is an expanded contextual insight from the AI analysis of how the meanings of the selected proverbs correlate with the 21st-century industrial innovation ideologies.

4.2 Discussions

From the results, it was found that there are Seven Ewe and 16 Akan proverbs that align and reflect the education, socio-environmental and industrial construct of our current world. In this score, there were more Akan proverbs that support 21st-century

TABLE 1 Selected Ewe and Akan proverbs that align and reflect 21st century skills and innovation.

SN	Proverb	Translation	Core meaning	Expanded contextual insight from AI analysis
EWE proverbs				
1	Ati dɛka menɔ dzogbe woa ave o.	<i>A single tree does not make a forest in the desert.</i>	Two heads are better than one.	This proverb emphasises collaboration and collective action, key aspects of 21st-century teamwork. In Industry 4.0, success often relies on collaborative efforts across disciplines. Identifying opportunities to collaborate is a valuable competence to teach children. Similarly, the workplace must be void of any sort of individualism and projection of individualised ambitions above others as collaborative efforts of trees would make a forest
2	Ge metua xo na aɔɔaba o.	<i>The beard cannot tell much to the eyebrow about the past</i>	There is experience in old age.	It encourages critical thinking and adaptability. In a fast-paced world, past experiences may not always translate to future success. The ability to learn and adapt is crucial. It is enlisted as one of the key competences needed at the workplace (Rios et al., 2020) and socio-environmental sustainability
3	Afɔ meɔya nugbe; atagba tsia afe o	<i>The foot does not go on a mission and leaves the thigh at home</i>	It is prudent to move with needed machinery.	This proverb highlights the importance of planning and holistic thinking. Projects require considering all aspects and preparation. It also underscores the construct of design thinking and production which has the potential of influencing environmental sustainability. Planning and production indeed should be extended to sustainable practises to safeguard our environment, making this traditional knowledge very useful.
4	Zego yibo me ye akatsa yi la do go tso	<i>The white porridge comes out of the black pot</i>	Great things can emerge from unexpected humble backgrounds.	Promotes openness to new ideas and innovation. Appearance does not always dictate outcome. Unexpected solutions can emerge especially from individuals or minority groups we may have tagged with wrong perceptions. Everyone deserves to be given a chance be it in the learning environment, workplace or community to share their ideas.
5	Ne nkugbagbato aɔɔ be yeke kpe fu ge wo la, nyaɛ be efe afɔ le kpe la dzi xoxo.	<i>When a blind person says they will throw a stone, then they surely has a foot on a stone already</i>	A daring fellow always has a supporter.	We see this proverb as encouraging strategic thinking and preparation. It suggests calculated moves based on planning, not impulsiveness. Whereas speed is required in dealing with problems before they escalate, it is prudent to carefully plan to make the execution of the solution effective. This means, planning could take time and understanding this principle is helpful to avoid impulsive actions that could potentially escalate problems.
6	Nuyɛɔuto me nyana be doto o	<i>The food-beggar has no knowledge about famine</i>	Misfortune does not respect time and seasons.	This proverb can reflect 21st-century thinking in that it underscores the importance of empathy and awareness of social issues, which are increasingly emphasised in modern organisational philosophies. Contemporary organisations often focus on social responsibility and the importance of understanding diverse perspectives. However, it could also be seen as somewhat limiting, as it implies a narrow focus on personal experience rather than a broader engagement with social issues.
7	Afi aɔɔ kpɔkpɔ nyo wu ya me kpɔkpɔ.	<i>Staring at a less important place is better than starrng in the air or into space</i>	It is better to be doing a menial job than being idle.	In the context of modern work environments, this proverb aligns well with the emphasis on productivity and the value of taking initiative, even when tasks may seem trivial. Many organisations today advocate for a culture of continuous improvement and encourage employees to contribute in whatever capacity they can, reinforcing the idea that action is better than inaction. This reflects a practical and proactive mindset that is prevalent in 21st-century organisational philosophies
AKAN (TWI) proverbs				
1	Wogyae deɛ woreye a, wonya adaagyeɛ.	<i>If you stop what you are doing, you have leisure</i>	Time should be judiciously, distributing it evenly across all tasks to be completed.	This proverb emphasises the importance of balance and mental well-being and time management which is critical for productivity and creativity. The justification is that it encourages taking breaks, which can improve overall productivity and innovation.

(Continued)

TABLE 1 (Continued)

SN	Proverb	Translation	Core meaning	Expanded contextual insight from AI analysis
2	Wo mfuo dɔɔso a, woyɛ ne nyinaa	<i>If you have many farms you have to cultivate them all</i>	However great your responsibilities, you must live up to them.	Highlights responsibility, time management, and resource management. This proverb encourages diligence and effective management of resources, aligning with productivity and initiative. It highlights the need for responsibility, but it also serves as sort of a warning not to take more tasks that one cannot handle. Whereas multitasking is a key competence in our 21st-century, the competencies, or skills to discern in keeping balance and accepting responsibilities according to personal and organisational strengths cannot be downplayed. Ability to keep balance and give equal attention to multi-tasks should by no means liquidate the quality of productivity.
3	Woforo dua pa a, na yɛpia woo.	<i>If you climb a good tree, we push you.</i>	Individuals onto something good he will get support	Promotes support for worthwhile endeavours, collaboration, and leadership. Teamwork and the importance of supporting good ideas and leadership is this current technology driven world. However, the positivity of this proverb can be challenged with this critical question; <i>What societal support can we absolutely provide for persons who might not be conscious of their unwholesome endeavours?</i> The constructs and philosophical underpinnings of inclusivity and giving equal or equitable supports to everyone in society, will make us reexamine who to classify or term “climber of a good tree climber” and perhaps make provisions for those climbing the bad trees to withdraw and follow a good cause.
4	Mfomsoo mpa onipa ho	<i>To err is human</i>	Making mistakes is part of human nature	This proverb creates room for acceptance of mistakes as a part of learning and growth. It aligns with the iterative process of innovation, fostering resilience and continuous improvement. Right from the classroom, 21st-century education through experiential learning pedagogies gives learners the opportunity to explore, make mistakes for improvement. Such competencies are vital especially in finding solutions to societal problems. It is this reason that we argue, persons who do not “climb good trees” as it were, should not be left alone but be given opportunities to learn from their mistakes with intentions to develop positive inclinations for a progressive course. When misapplied however, people may give excused for lack of diligence in their work with claims of human limitations.
5	Afonfanu we adee a ɛde ntem	<i>If two cheeks chew something, the job is quickly done</i>	Two can do better than one	This proverb highlights collaboration and teamwork. There is absolute efficiency of working together, which is crucial for modern team-based projects. However, the difficulty of inability to work together effectively lies in the extreme lack of collaborative skills. It is for this reason it becomes imperative that every learning environment provides opportunities for collaborative competencies and in which case, teachers for example, must demonstrate agility in supporting learners.
6	Yɛfiri baako na ɛko mmieniu	<i>We count one before we count two</i>	First things first	A proverb that promotes logical thinking and step-by-step problem-solving. Indeed, design thinking and innovation are hinged on critical thinking and planning, foundational for effective decision-making.
7	Obi nnim n'adee nso enye ne sɛ anka obegyina ho	<i>No one knows everything, but that does not mean one cannot contribute</i>	Not everyone has knowledge about the same issues.	This promotes collaboration and sharing knowledge by encourages collective intelligence and teamwork. Collaboration cannot be underestimated in this epoch of industry 4.0. We need all hands-on deck to deal with societal issues and problems therefore, this proverb can help reiterate the impetus of collaboration.
8	Adom nyinaa ne oɔɔ	<i>All grace is love</i>	When there is love, there is no fault-finding	Promotes love and empathy. The justification is that it enhances social and emotional learning. Much of our attempts to solve daily societal problems are linked to the constructs of love and empathy for people. It is therefore an interesting proverb that must be frequently used to promote motivation of love, affecting design thinking and behavioural actions.

(Continued)

TABLE 1 (Continued)

SN	Proverb	Translation	Core meaning	Expanded contextual insight from AI analysis
9	Obi nnim a, obi kyere.	<i>If someone does not know, the other teaches.</i>	It is no shame to ask about what you do not know. Knowledge should be shared for societal progress.	This underscores curiosity and open communication. To clarify, it supports lifelong learning and information literacy. Whereas self-direction is important, we cannot underestimate the power of inquiry through genuine communications. Seeking the right information or sharing ideas on issues is vital. Organisational leaders or design thinkers have a responsibility to be open to ideas from people.
10	Ti ketewa nanso yede sew gu so.	<i>A head may be small, but it carries a crown</i>	At times, the despised is able to contribute ideas to the success of a venture.	This promotes the value of individuals and potential for leadership. Encourages leadership skills and self-esteem. From the perspective of pedagogical leadership, everyone is considered a leader in the organisation and for that matter be given their agencies to lead or make decisions within the framework of the organisation.
11	Wope adee a, na eye adwuma	<i>If you want something, you must work for it</i>	Success is achieved when it is worked for	Critically, this proverb underscores hard work and perseverance. It is a way of promoting initiative and productivity. Our traditional societies frown on criminality and taking things that do not belong to you. In the same vein, encouraging legal work amongst the youth would help reduce street beggars in our communities and over-dependency of females on men for everything.
12	Wotwa dua a, edu soro	<i>When you cut a tree, it goes up.</i>	Just as a tree grows when pruned, progress comes when you let go of certain things like beliefs, and practises.	The proverb resonates with 21st-century philosophies in its underlying message of growth through change. It captures the essence of adaptability, resilience, and strategic renewal, which are central to education, socio-environmental approaches, and industry. However, the consequences of design concepts that cause the depletion of the earth should not only be rethought, but effective design thinking should help mitigate the production of inventions that promote devastating consequences on the natural environment globally. Again, downsizing or automation without considering its broader impact on employees or society may lead to short-term gains but long-term instability. This highlights the need for balance in applying the proverb to industrial contexts.
13	Se woye aye a, ebeba wo nkyen	<i>If you do good, good will come to you</i>	It is always a blessing in return when you do good.	This promotes positive behaviour and ethical actions. It supports social skills and ethical leadership. Given the challenges of our modern world, treating others and the environment with kindness as one desire to be treated needs to be encouraged. Such ethical behaviour at the workplace and within society helps to improve safety and well-being. Positive attitudes towards the environment promotes environmental sustainability.
14	Anomaa antu a, obua da	<i>If the bird does not fly, it goes hungry</i>	Sitting idle usually prevents one from meeting his or her needs.	It promotes taking action and seizing opportunities. This aligns with initiative and adaptability which is also a 21st-Century competence. Design and innovation have their roots in inquiry or explorative adventures which is encouraged at the 21st-century workplace and for solving societal problems. Challenges relating to ecological and environmental sustainability require action and not idleness.
15	Nea odaadaa ne ho no, otumi daadaa won a woda ne nkyen	<i>Those who deceives themselves can deceive those around them</i>	There is danger of self-deception which can affect others.	This proverb emphasis deceit and manipulation which does not support ethical behaviour or integrity. However, it contextually resonates strongly with 21st-century philosophies, particularly in emphasising the value of integrity, authenticity, and self-awareness. It serves as a timeless reminder that self-deception not only affects the individual but also creates ripples that can harm relationships, communities, and institutions. It aligns with contemporary calls for authenticity and ethical responsibility, whilst highlighting areas where these values may still fall short.
16	Wofura ntomago a wonni apiripiriagoro	<i>If you put on an old cloth, you do not play a violent game</i>	You act within your means	The proverb provides timeless wisdom about acting responsibly and prudently within one's circumstances. Whilst it aligns with contemporary values of sustainability and resource optimisation, it contrasts with the ambitious, risk-embracing ethos prevalent in many aspects of modern life. The key is balance: recognising when caution is wise and when bold action is necessary to achieve growth and innovation.

TABLE 2 Selected Ewe and Akan proverbs that contrast 21st century skills and innovation.

SN	Proverb	Translation	Core meaning	Expanded contextual insight from AI analysis
EWE proverbs				
1	Ne ati aḍe le nya dim ye sia yi le fiawo n̄uti la, mumue le dzrom.	<i>A tree which provokes axes wishes to be cut down</i>	There is a consequence for daring. Or punishments await crime.	This discourages healthy conflict and debate, potentially discouraging risk taking or picking up a challenge. Challenging ideas can lead to innovation. Creating enabling environments that promote healthy competitions through contesting ideas is important innovative practises in this 21st-century culture of problem-solving and innovative thinking.
2	Agaga lolo meflea agaga eve fe nu o.	<i>One big cowry cannot be used to pay for two cowries</i>	Every problem with its solution.	Contextually, this proverb has the potential to discourage resourcefulness in problem-solving. Whereas there is unique approach to solving each problem and two different issues cannot be interchanged, staying glued to that religiously could potentially limit curiosity and mastery of resourcefulness. Limited resources can often be used creatively to meet needs. Decision-making becomes the underpinning factor that makes this proverb somewhat subjective. Whereas the need for resourcefulness is key, the decision of selecting the right resources and approaches to solving problems can be challenging and contentious. However, given that 21st-century thinking is hinged on adaptability and taking up challenges, the competence of resourcefulness cannot be overlooked. Meaning, the possibility of using a particular strategy to solve multiple problems is high and must not be discouraged.
3	Du aḍewo fe gbagbā ye nye du aḍewo fe nyonyo.	<i>The fall of some nations enables the rise of others.</i>	People thrive on others' mistakes to succeed.	Focuses on competition over collaboration. Industry 4.0 encourages collaborative problem-solving for global challenges. Whereas competition is not wrong, the negative perspective of competition might lead to mass problems. To make it clearer contextually, the predicaments leading to a collapse of an organisation or industry has a high stake of affecting other organisations or industries within the production and marketing chain. For which reason, organisations have collective responsibility to support each other for stability and grow as a "win - win" thinking and practise.
4	Adeḍjitsa kple lāḍjitsa ye doa go.	<i>A very experienced hunter will surely meet an experienced wild animal</i>	Everyone has their match.	This proverb suggests a predetermined outcome, which discourages adaptability and flexibility. Whereas it might be wrong to formulate possible outcomes or consequences to actions, it is rather prudent to encourage adaptability to deal with issues when confronted with difficult situations.
5	Tōmedela ye gbāa ze.	<i>Only the one who kindly accepts to fetch water may accidentally break the pot</i>	The expert also makes mistakes.	This does not encourage initiative and risk-taking. Innovation often requires some element of risk. Contextually, the other side of this proverb can be argued in a positive light as it creates the awareness of risks that resonate with human endeavours. Whereas 21st-century thinking encourages daring adventures, the risk associated with innovations and inventions cannot be liquidated. One cannot get comfortable with the possibilities of human shortcoming but rather strive for excellence always with little or no errors.
6	Dō bu meḍua nu, dō bu dōa atsi o.	<i>An empty stomach cannot be constipated in place of the one who has received food</i>	No one suffers for the sins of the other.	The proverb emphasises the importance of personal accountability which aligns with modern philosophies such as personal development and individual responsibility. However, the notion that "no one suffers for the sins of the other" can contrast with 21st-century thinking about collaboration and shared responsibility. In many modern organisations, there is an understanding that teamwork and collective accountability are crucial for success. The idea that one person's actions can affect the entire team or organisation is increasingly recognised, which may not fully align with the individualistic perspective of this proverb. The proverb also suggests a clear division between the fates of individuals, which may not reflect the 21st-century emphasis on collective well-being and social responsibility. Modern organisational philosophies often advocate for corporate social responsibility (CSR) and a more holistic view of success that includes the welfare of the community and environment, rather than solely focusing on individual gain.

(Continued)

TABLE 2 (Continued)

SN	Proverb	Translation	Core meaning	Expanded contextual insight from AI analysis
7	Anyigba le sesēm gake agama d̄oa afo anyi blewu.	<i>Though the earth is solid, the chameleon makes cautious steps on it</i>	One must be cautious about their movements.	This proverb emphasises caution and hesitation in taking actions. A deeper analysis of the proverb reflects both positive and negative synergies within the scope of 21st-Century ideologies. Whilst caution is important, excessive hesitation can hinder progress. Hesitations can be likened to indecisiveness which can bring dreadful consequences. Such dispensations would not be healthy for organisational or systemic growth as delayed decisions can be very costly. Ability to make swift decisions in dealing with socio-environmental issues and industrial challenges is one key competence of the 21st-Century.
8	Klugā me nye vigā o	<i>The loved servant of someone does not replace his loved son</i>	Everyone must bear a child.	On one side, this discourages diversity and inclusion. Different perspectives and talents contribute to innovative teams. On the flip side, this proverb could possibly advance creativity from the perspective that an outcome is expected from every member of the organisation “bearing their own fruits.”
9	Zigā me nye fia o	<i>The possessor of a big stool is not necessarily a king</i>	Position is not possession.	This proverb potentially discourages meritocracy and the value of earned leadership. Effective leadership in the 21st-century is based on skills and competence, not just titles. However, it is important for organisational leaders to note that their current roles are not permanent hence perform to the benefit of all.
10	Ame n̄uto fe golomehe ye si na ame	<i>One is usually hurt by their own dagger.</i>	Your best friend is your worst enemy.	Focuses on individual blame rather than systems thinking. Innovation often requires identifying and addressing systemic issues, not just personal shortcomings. Systemic thinking is enshrined within the social construct of “we all” therefore, whereas self-reflection is a good way to shape individual contributions in an organisation, negative self-reflection - in this case, self-blame and blaming others for problems can lead to negative synergies affecting expected outcomes.
11	Ne lo lolo uuu hā la, azimevi ko wonye	<i>No matter how fat a crocodile is, it is still hatched from an egg</i>	One cannot deny their roots.	Discourages growth and the potential for transformation. Innovation involves learning and evolving beyond initial limitations. Limitations should therefore be perceived as opportunities to explore evolution and transformation and not static thinking or unhealthy perception of contentment. In a learning environment for example, teachers should encourage learners to push beyond their abilities for growth. Meanwhile, in our modern world culture is valued, individuals must not forget their cultural identity which brings diversity to the work environment.
12	Avu d̄una avutō	<i>A dog turns on its own master.</i>	Beware of friends.	Whilst this proverb acknowledges betrayal, it discourages trust and collaboration. Innovation often thrives on teamwork and open communication. It is therefore important to work towards minimising or avoiding any tendencies of betrayals or frictions when working collaboratively with people.
AKAN (TWI) proverbs				
1	Agofaako na ede kwaseabuo ba	<i>Playing at one place continuously brings about cheating</i>	When you do not have the wherewithal to move on from your current place of survival, people begin to treat you anyhow, including cheating you.	It focuses on negative behaviours without offering solutions or promoting constructive actions. This does not align with promoting ethical behaviour or innovative problem-solving. It is true that unfair treatments are frowned on within the contexts of gender, equality or equity and social inclusion (GESI). However, the solution does not lie in responding to unfairness with negative behaviour at the workplace or in the social environment.
2	Fufuo nko ara nnante	<i>Fufuo does not walk alone</i>	Fufuo (A local Ghanaian dish) is eaten with soup or stew and not alone hence everyone needs a companion	This could imply dependency rather than independence and self-sufficiency. Whereas companionship and collaboration are paramount in this modern world, it does not encourage initiative and individual responsibility which are critical for innovation. As mentioned earlier, self-initiative and direction is one of the 21st-century skills needed for effective collaboration and leadership roles. Overly encouraging dependency potentially could stifle self-directed initiatives and make people always looking up to others for help then making self-supported efforts. The common sights of beggars and females looking up to men for financial support in our society can be likened to lack of self-initiatives and directives to support one's-self.

(Continued)

TABLE 2 (Continued)

SN	Proverb	Translation	Core meaning	Expanded contextual insight from AI analysis
3	Obi mma ne ho amo	<i>No one congratulates him/herself</i>	Caution against advertising personal achievements	This proverb could discourage self-recognition and confidence. Self-acknowledgement is important for motivation and leadership development. It is vital and a strong motivation to enact self-initiative and direction which is also enlisted as one of the 21st-century skills or competence. Every milestone should be acknowledged and used as a basis to forge forward in attaining much more progress.
4	Obi nkogyɛ ɔbofoɔ adeɛ nni na ɔnye hammusuo	<i>No one goes to collect hunter's meat to eat and hinders him</i>	You do not interfere with a progressive course or harm the person who is helping you	It is a proverb that focuses on avoiding interference rather than encouraging proactive engagement or support. It does not foster collaboration or mutual support when perceived through the lens of 21st-century thinking. In a reverse analysis, there could be a positive side of this proverb. In that, interfering in affairs of people or events might create a hindrance of a progressive course which has to be guided against.
5	Obi nkyerɛ apantweaa ba akom hye	<i>No one teaches the bat's child how to hang</i>	Certain abilities, instincts, or knowledge come naturally, often through inherent traits, upbringing, or environment.	The proverb suggests that innate ability alone is sufficient, which may undervalue the importance of education and mentorship. It therefore undermines the value of learning and skill development, essential in the 21st-century. People need to be supported to develop and not left alone. However, a contextual analysis indicates that the same proverb has the potential to support independent initiatives in personal continuous development which is also key in the 21st-Century.
6	Wo dan ne wo fie, w'ani gye	<i>Your room is your home, be content</i>	Be content with what we have, and not pierce ourselves with sorrows trying to imitate others.	This proverb highlights complacency and does not encourage innovation or continuous improvement. Yes, contempt is vital to acknowledge one's progress made. However, there is a need to interrogate every conclusion for improvement. For example, without interrogating the first smartphone models, we may not have the current ones now and likely not have any new models in the future. We cannot remain complacent and expect progress.

ideologies that drive education and industry than that of the Ewe people. We found this correlating to the impressions highlighted by Appiah-Sekyere (2016) that the Akan people project work as great ethical value and abhors laziness which is often promulgated through the expression “Adwuma, adwuma” (*Work, work*) and its response “adwuma ye” (*work is good*) (Appiah-Sekyere, 2016, p. 112). This could account for the several proverbs contextually supporting the 21st-century skills which include critical thinking, creativity, collaboration, communication, information literacy, media literacy, technology literacy, flexibility, leadership, initiative, productivity, and social skills (Çiftci et al., 2021; Kennedy and Sundberg, 2020; Rios et al., 2020). Take for example the Akan proverb “Wotwa dua a, edu soro” (*When you cut a tree, it falls down*)-a proverb which highlights the awareness of consequences of actions. Contextually, competencies required for the 21st-century workplace include critical thinking and innovation with marginalised risky repercussions when dealing with socio-environmental challenges. Hence, consequences of design concepts that cause the depletion of the earth should not only be rethought, but effective design thinking should help mitigate the production of inventions that promote devastating consequences on the natural environment globally. But, such proverbs as this one frequently used in the Ghanaian education and industry settings to drive some environmental sensitivity and responsiveness in the daily routine of the people remain rhetorical. Rather illegal mining “galamsay” and waste management has been identified as one of the major threats on the environment in Ghana (Aikins, 2024; Lissah et al., 2021). Interestingly, Accra and Kumasi where Akan is widely spoken are listed as top cities with waste management problems

(Kwakye et al., 2023) whereas illegal mining is mostly done in Akan communities. It creates the notion that the proverb has not proven any moral or ethical influence on the people, and perhaps because it is not even frequently used in daily communication. Again, the findings revealing only a few Ewe proverbs reflecting and aligning with 21st-century ideologies does not underscore that Ewe people are not industrious. Instead, the Ewe people have also been identified, particularly the Anglo-Ewe as illustrious and hardworking (Venkatachalam, 2015). For both ethnic groups to possess some proverbs that can be used to advance the nurturing of 21st-century competencies require a further inquiry into the frequency of proverb usage in Ghanaian educational setups, industry, and public places. The analysis of the findings also reveals that some of the proverbs from both the Ewe and Akan origins reflect similar concepts. For example, the Ewe proverb “Afo meya nugbe; atagba tsia afe o” (*The foot does not go on a mission and leaves the thigh at home*) and the Akan proverb “Fufuo nko ara nnante” (*Fufuo does not walk alone*). Both proverbs contextually advance collaboration and need to mobilise needed resources. This consolidates the common notion that the various ethnic groups in Ghana have a blend of shared cultural norms, values, and practises (Kwabena, 2020; Sea, 2022; Agyekum, 2019). Looking at the philosophies of the 4th Industrial Revolution which emphasises the fusion of technologies and the blurring of lines between the physical, digital, and biological spheres (Trauth-Goik, 2020; Kennedy and Sundberg, 2020; Çiftci et al., 2021), it can be posited that our search could not establish a set of Ewe and Akan proverbs that directly highlights technological and digital advancements. However, inferences from some of the proverbs fits

well within the contexts of digital applications. For example, the Akan proverb “Wo mfuo dɔso a, woɛ ne nyinaa (*If you have many farms you have to cultivate them all*) promotes the competency of handling all responsibilities within stipulated deadlines. Giving the current digital technological world the ability to multitask and meet deadlines is admired and the wide range of AI tools and other digital applications have made it easier, leaving no room for excessive excuses for underperformance due to workload. This proverb, when deeply analysed in digital contexts, highlights the need to take advantage of modern technologies to complete tasks without delays. In another light, we found some of the proverbs possessing duo contextual meanings, making it difficult to position them under the two groupings in this study. The final placement of such proverbs with two sides were therefore done based on the in-depth interpretation and relatedness to 21st-century philosophies. For example, the Akan proverb “Mfomsoɔ mpa onipa ho (*To err is human*) acknowledges human limitations and gives the opportunity to learn from mistakes and grow. When misapplied however, people may give excused for lack of diligence in their work with claims of human limitations. The modern industrial action, though permits experimentation, does not give room for excessive error so as to reduce loss and maximise efficacy – a caution is therefore recommended when applying such proverbs with duo implications.

5 Conclusions implications and limitations

5.1 Conclusion

This article examined a selected Akan and Ewe proverbs as a body of indigenous and traditional knowledge through the lenses of 21st-Century skills and philosophical underpinnings. The focus was to identify the proverbs (indigenous and traditional knowledge) that support the philosophical constructs of 21st-Century thinking and competencies. The study found a total of 23 (Seven Ewe and 16 Akan) proverbs that align and support 21st-Century philosophies of design thinking and innovation for socio-environmental sustainability through a contextual critical analysis of the selected proverbs. These proverbs are worthy of everyday usage in creative and innovative organisations, serving as strong motivation for critical thinking, creativity and problem-solving competencies in this modern world of various global socio-environmental challenges. We argue that traditional knowledge is inherently dynamic and evolving alongside the communities that use them. Therefore, scrutinising these philosophies through the lens of contemporary needs is essential, particularly in the realms of problem-solving and environmental sustainability. This approach is exemplified in our study by analysing the selected proverbs from Ghanaian cultures (Akan and Ewe) through the lens of 21st-century skills and the Fourth Industrial Revolution. The analysis highlights proverbs that align with critical thinking, creativity, collaboration, and problem-solving, recommending them for cultural heritage and sustainability through frequent usage. Contextually, there are some proverbs (12 Ewe and six Akan) identified that may discourage the daring or adventurous philosophical underpinnings

of the 21st-Century inspirations for design and innovation, potentially hindering progress. However, their socio-cultural significance could be impactful in different contexts. This therefore does not necessarily mean they are bad proverbs. Again, as shown in the results and discussion, Akan proverbs that support 21st-Century education and industrial competencies were found to be over twice of those found in the Ewe proverbs. This does not mean the Ewe people on the other hand, are not industrially conscious. Again, it was thought that since some proverbs support environmental responsiveness and sustainability, these proverbs would have impacted the behaviour of the people. However, gross cases relating to waste management and illegal mining remain an environmental threat. It can therefore be concluded that these proverbs have not largely influenced societal thinking in dealing with socio-environmental challenges in Ghana.

5.2 Implications and contribution

Methodologically, our paper is the first to explore critical contextual analysis of selected Ewe and Akan proverbs to ascertain their relatedness to the 21st-century ideologies in education, industry and socio-environmental paradigms. The paper therefore contributes to existing literature on Ghanaian proverbs. Our use of the language model AI is to gain insights into the proverbs, and sets the pace for other scholars to delve into similar fields. It provides insights on different scholarly applications of the trending AIs in scientific research. Again, given that some traditional knowledge codified in Ewe and Akan proverbs inculcate a sense of environmental stewardship and responsibility, there is a need to maximise the use of such proverbs in schools, institutions and industries to incite a sense of environmental knowledge in the people. This paper, therefore, becomes the first to expose the relations between some Ghanaian proverbs and 21st-Century thinking and competencies, thereby reemphasising the timeless relevance of traditional knowledge especially as codified in proverbs or wise sayings. The paper also highlights the need for organisations and institutions to assume a sense of responsibility to incorporate some of our proverbs as traditional knowledge into their organisational canons, vision, mission, and core value statements due to their potential impact in this industry 4.0. It also outlines the essence of educational institutions encouraging teachers to integrate the use of proverbs in their learning environments to help modify the behavioural and thinking faculties of learners for positive attitudinal change. These qualities of our study, potentially, could impact policy and practise on use of local Ghanaian languages both in the formal and informal settings for preservation of Ghanaian culture, identity, and transformation of public mindset towards environmental stewardship.

5.3 Limitation and recommendation

Whereas our study focused on analysing selected proverbs through the 21st-century philosophical lenses, this could have been complemented with interviews to engage other experts and ethnic elders, adding more texture to the qualitative discourse.

Also, to further understand the impact of the proverbs in the behaviour and thinking of the two ethnic groups, an ethnographic study could be helpful. Future studies looking into the specific aspects of everyday life of the ethnic groups could be conducted and analysed against their most frequently used proverbs for inferences to be made on how the use of proverbs actually reflects the behaviours of the people. An extensive inquiry into the frequency of proverb usage by the Ghanaian people in daily speech amongst the youth and elderly especially in education institutions and workplaces could be insightful to shape policy on Ghanaian folklore and cultural identity.

Author contributions

BQ: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. KM: Data curation, Resources, Writing – original draft, Writing – review & editing.

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