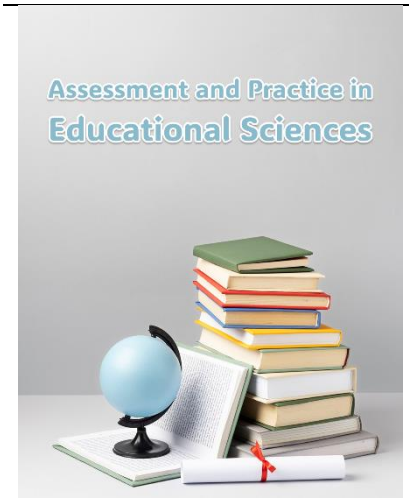
Assessment and Practice in Educational Sciences



Systematic Review of Future Thinking Skills and Their Impact on Academic Achievement

1. Noor. Naim Ajel: PhD student, Department of Educational Management, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran.
2. Ali. Khalkhali*: Assistant Professor, Department of Educational Management, Tonekabon Branch, Islamic Azad University, Tonekabon, Iran. (Email: 1502113554@iau.ir)
3. Falih Abdul Hasan Owai. Al-Nuairi: Professor, Department of Science, Faculty of Basic Education, Diyala Branch, University of Diyala, Iraq.
3. Mahbuh Sadat. Fadavi: Associate Professor, Department of Educational Management, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran

Article type:
Original Research

Article history:
Received 05 December 2024
Revised 13 February 2025
Accepted 23 February 2025
Published online 1 March 2025

How to cite this article:
Naim Ajil, N., Khalkhali, A., Abdul Hasan Owai, F., & Sadat, M. (2025). Systematic Review of Future Thinking Skills and Their Impact on Academic Achievement. *Assessment and Practice in Educational Sciences*, *3*(1), 1-16. https://doi.org/10.61838/japes.3.1.1

ABSTRACT

The objective of this study was to conduct a systematic literature review (SLR) of research on future thinking skills in higher education during the period from 2014 to 2023, with a focus on classifying these skills and analyzing their impact on students' academic achievement. The systematic literature review (SLR) methodology was employed to analyze previous studies related to future thinking skills in higher education. The search process included major academic databases such as ERIC, ResearchGate, and Google Scholar, in which 507 articles were screened, and 22 relevant studies were selected based on predetermined inclusion and exclusion criteria. This review revealed a significant shortage of published research on future thinking skills in higher education, as only 22 relevant studies were identified out of the 507 articles reviewed. In recent years, particularly between 2020 and 2023, there has been a notable increase in the number of published research articles in this area, indicating growing academic interest in foresight-related thinking skills. Three Arab countries dominated research output on future thinking: Iraq, Egypt, and Saudi Arabia. This reflects the growing regional interest in fostering students' future thinking skills. Future thinking skills were classified into three main categories: Preventive skills, such as future planning, scientific forecasting, and decision-making; Creative skills, such as envisioning the future and constructing scenarios; and Adaptive skills, such as solving future problems, trend analysis, and positive thinking. Studies have shown a positive relationship between future thinking skills and students' academic achievement. These skills contribute to improved academic performance, increased motivation, and enhanced self-regulation and the ability to make sound academic decisions. This systematic review emphasized the importance of integrating future thinking skills into higher education curricula, given their positive impact on students' academic achievement. It also recommended conducting further research to develop effective measurement tools for these skills and to design educational programs that systematically enhance them.

Keywords: foresight, cognitive skills, academic achievement, systematic review, PRISMA

Introduction

In an era characterized by rapid technological transformation, socio-economic shifts, and complex global challenges, the cultivation of future thinking skills has become an indispensable educational priority. The demands of the twenty-first century extend far beyond the acquisition of factual knowledge; they require learners to anticipate, adapt to, and shape uncertain futures with creativity, resilience, and strategic foresight (1-3). Future thinking, as an educational construct, integrates proactive

planning, scientific forecasting, creative scenario-building, and adaptive problem-solving, enabling individuals to respond effectively to unpredictable developments in both professional and personal contexts (4-6). Within higher education, such competencies are increasingly recognized as essential for enhancing academic achievement, fostering employability, and supporting lifelong learning (7-10).

The educational literature reveals that future thinking draws upon interdisciplinary domains, including cognitive psychology, creativity studies, strategic foresight, and futures studies (11, 12). Early theorists such as Torrance emphasized the integration of creativity and futurism into education to prepare learners for complex societal transformations (5, 6). Contemporary frameworks extend this vision by embedding future-oriented pedagogies into formal curricula, non-formal learning environments, and lifelong education systems (3, 13, 14). These pedagogies cultivate the ability to forecast emerging trends, imagine alternative scenarios, and make strategic decisions under uncertainty (1, 4).

Despite its importance, research on future thinking skills in higher education remains comparatively limited when set against more established areas such as critical thinking and creative thinking (15, 16). Systematic literature reviews in this domain have highlighted significant gaps, particularly in the development of standardized assessment tools, longitudinal impact studies, and cross-cultural comparisons (17-20). The scarcity of empirical work is partly attributed to the historical emphasis of educational systems on content memorization and exam performance rather than forward-looking cognitive competencies (21, 22). Nevertheless, recent global disruptions, notably the COVID-19 pandemic, have accelerated interest in strategic foresight within education, revealing the vulnerability of traditional pedagogies to systemic shocks (23, 24).

The conceptualization of future thinking encompasses multiple dimensions. Proactive skills involve setting long-term goals, designing strategic action plans, and anticipating challenges (25-27). Creative skills focus on imaginative scenario generation and the envisioning of innovative solutions (28-30). Adaptive skills include problem-solving under uncertainty, trend analysis, and the flexible reconfiguration of strategies in light of new information (31-34). Integrating these skills into higher education not only strengthens academic performance but also equips graduates for volatile employment landscapes and societal change (35-37).

From a pedagogical standpoint, the development of future thinking aligns with educational movements toward transformative and anticipatory learning (14, 34). These approaches move beyond knowledge acquisition to empower learners as active agents in co-creating preferred futures (3, 7). Pedagogical strategies for fostering such competencies include futures problem-solving programs (6), multidisciplinary project-based learning (8), and socio-scientific issue-based instruction (35). Additionally, interventions that integrate emotional intelligence, metacognition, and collaborative learning have demonstrated potential in enhancing students' capacity to think critically about long-term implications (9, 38, 39).

Empirical studies conducted in diverse educational contexts further illuminate the relationship between future thinking skills and academic outcomes. For example, Salman (15) found that proactive planning and crisis management significantly correlated with improved academic performance among university students. Similarly, research by Alqahtani and Elsayed (25) demonstrated that predictive reasoning and visualization skills played a pivotal role in guiding students' academic decision-making. Nasha (16) reported that science education programs grounded in social constructivist principles enhanced both sustainable consumption practices and future thinking competencies in preparatory school students. Other studies have shown that training in future problem-solving can reduce dropout rates (31), enhance resilience (7), and strengthen self-regulatory capacities (23, 24).

Cross-national research also highlights variations in how future thinking is integrated into curricula and educational policy. In the Sultanate of Oman, Al-Kharousi (32) identified significant differences in future thinking competencies among twelfth-grade students depending on contextual factors such as teacher expertise and resource availability. In Iraq, Karim and Thamer

(26) examined future thinking among medical students, linking it to academic specialization and exposure to problem-based learning. In France, Julien et al. (30) piloted an innovative framework in education for sustainable development, demonstrating measurable gains in students' anticipatory skills. Similarly, in Thailand, Phusee-orn and Pongteerawut (33) analyzed the determinants of future thinking among ninth graders, providing evidence for culturally responsive pedagogical design.

While these studies underscore the multifaceted benefits of future thinking, they also reveal methodological limitations in the existing literature. Many rely on cross-sectional designs, limiting causal inference (17, 19). A substantial number employ self-reported questionnaires without triangulation from behavioral or performance-based measures (40)s. Furthermore, the heterogeneity of assessment tools impedes meaningful comparison across studies (27, 34). Calls for the development of validated, standardized instruments have been made repeatedly in the literature (18, 20).

The theoretical underpinnings of future thinking draw from constructivist and socio-cultural learning theories, as well as models of creativity and innovation (3, 4, 13). Constructivist approaches emphasize learners' active role in knowledge construction and the importance of contextualized, meaningful experiences (16, 36). Futures-oriented education also resonates with UNESCO's vision of education for sustainable development, which stresses foresight, critical inquiry, and ethical responsibility (30, 34). By engaging students in forecasting exercises, backcasting processes, and scenario evaluations, educators can help bridge the gap between abstract foresight and actionable planning (41, 42).

The integration of future thinking into formal education faces practical challenges. These include limited teacher preparation in futures literacy, constraints of standardized curricula, and competing policy priorities (11, 12). Nevertheless, successful case studies suggest that embedding future thinking across disciplines—rather than treating it as an isolated subject—can yield significant benefits (29, 38). Interdisciplinary projects, collaboration with industry partners, and community-based foresight activities have been shown to enhance student engagement and skill transferability (25, 33).

This growing body of evidence points to a clear conclusion: future thinking is not a luxury skillset, but a foundational competence for navigating complexity. As global trends in technology, climate change, and socio-political shifts continue to accelerate, the role of education must evolve from preparing students for known jobs and challenges to equipping them for unknown futures (1, 6). Future thinking provides the cognitive and affective tools necessary for resilience, innovation, and adaptive capacity (7-9).

The present study builds upon this context by conducting a systematic literature review of future thinking skills in higher education from 2014 to 2023, with a particular focus on their classification and their impact on academic achievement.

Methods and Materials

The present study is experimental and of the analytical–field type. For this purpose, 40 intermediate-level German language learners from a language institute were selected. In the field section, the learners of one class were divided into two homogeneous groups in terms of age and language proficiency level, based on their scores. The instructional process was conducted in two formats: monolingual (target language: German) and bilingual (native language: Persian, and target language: German) in the two groups separately.

In the first group, instruction was carried out entirely in the target language without considering the native language, focusing on the target language (German) with the aim of enhancing learners' mastery and concentration, and ultimately simulating immersion in an environment based on the target language. This was done while taking into account linguistic and cultural aspects by the designated instructor (proficient in the monolingual method).

In the second group, instruction was conducted in a bilingual format, using both the native language and the target language simultaneously, with the native language serving as an auxiliary factor, but at the same time presenting contrasts with the new language and vocabulary.

Finally, after a defined period of one academic term, both groups were analyzed and evaluated in terms of spoken language and mastery of the language through the administration of a standardized test appropriate for the intermediate level. Additionally, learners' interest in continuing their language learning under the respective teaching method was assessed.

Findings and Results

The method used in this study was a systematic literature review (SLR) in accordance with the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) guidelines. A systematic literature review is a method for collecting relevant data on a topic that meets predetermined eligibility criteria (Mengist, 2020). This SLR was employed to locate related articles in key databases and to address the research questions. PRISMA establishes a peer-reviewed, standardized method that utilizes a checklist to help ensure the quality of the review process and its reproducibility (Moher, 2009; Moher, 2009). The four main steps in PRISMA are: identification, screening, eligibility, and inclusion. By following PRISMA guidelines, it is possible to accurately search for the skills or dimensions of future thinking employed. These four main steps are explained as follows:

1. Identification

In the identification stage, actions are taken based on predetermined research questions. The search for articles in online databases was conducted using keywords related to the research questions. Keywords serve as a tool to filter search results in certain indexed journals.

Table 1. Keywords

Keyword	Search Terms
All future-oriented keywords	Dimensions or components of future thinking, future thinking skills, ability of future thinking, Future thinking skills, Future thinking

Table 1 specifies the keywords used by the researcher to search for articles in the search engines of several indexed journals. The author compiled a list of synonyms and alternative terms based on the most frequently used searches. The databases used in this study included four indexed journals: Scoops, ResearchGate, ERIC, and Google Scholar. These four databases served as platforms to observe the distribution of research related to future thinking skills.

Using the keyword search strategy in search engines, the following results were obtained: 48 indexed articles in Scoops, 39 indexed articles in ERIC, 260 indexed articles in Google Scholar, and 160 indexed articles in ResearchGate. In total, 507 articles from journals were categorized at this stage.

2. Screening

At this stage, screening was carried out using the inclusion and exclusion criteria explained in Table 2. The articles identified in the previous stage (identification stage) were assessed and screened according to the predetermined inclusion and exclusion criteria.

Table 2. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria

Published from 2014 to 2023 (last 10 years)	Earlier than 2014
Journal articles, conference proceedings	Non-periodicals, review journals, master's theses, introductions, opinions
Published in English or Arabic	Not published in English or Arabic
Research on future thinking skills	Did not address future thinking skills
Open access	Not open access

Table 2 specifies the inclusion and exclusion criteria for filtering articles based on publication date, language, field of study, and research accessibility. Retrieved articles were only those published within the ten-year period between 2014 and 2023. Extracted data included journal articles, while any books or book chapters were excluded from the selection process. Furthermore, only English and Arabic articles were considered to minimize potential translation issues. Regarding the field of study, selected articles had to be specifically related to future thinking skills, and those outside this scope were excluded. Finally, the focus was on open-access publications, and journals without accessible content were excluded. After the screening stage, 288 articles were identified for final selection.

3. Eligibility

The eligibility stage consists of articles meeting the eligibility criteria. After the screening stage, the filtered articles were reassessed using the eligibility criteria for final evaluation.

Table 3. Eligibility Criteria (EC)

Eligibility Criteria (EC)
EC1: Studies in the field of foresight
EC2: The research method is quantitative or qualitative development, not a systematic review
EC3: The abstract contains the main research keywords, namely: future thinking skills or future thinking
EC4: Involves students and teachers at all educational levels (primary, middle school, high school, college students)

Table 3 serves as a guide for selecting articles in the eligibility stage. Articles identified in the screening stage still included some from other domains, which were disregarded if unrelated to the fields of science education, physics, or biology. The title, abstract, and methodology of articles were thoroughly reviewed to ensure they aligned with the study's criteria and objectives. Articles were assessed based on titles and abstracts containing the specified keywords in Table 1. Furthermore, the focus was on all research methods except SLR (due to similarity to the present study). Finally, articles examining students or teachers at all educational levels were selected, and review articles were excluded. As a result, 58 articles were chosen at this stage.

4. Inclusion

The final stage of the PRISMA approach is the inclusion of articles that have passed multiple screening steps. In this stage, eligible articles were comprehensively reviewed for selection as core literature. All responses to the research questions had to be relevant to the research objectives and cover aspects such as research design, implementation methods, type of data collection, and research interventions. Duplicate articles were removed at this stage. Articles that did not address the specified research questions were excluded. In the final stage, 22 articles were selected as the core literature. The PRISMA steps in this study are presented through a flow diagram in Figure 1. These steps identify articles that address the research questions as the core literature for the systematic review. The following section will examine how the research study was conducted in terms of research characteristics, methodology used, and clearly defined research objectives.

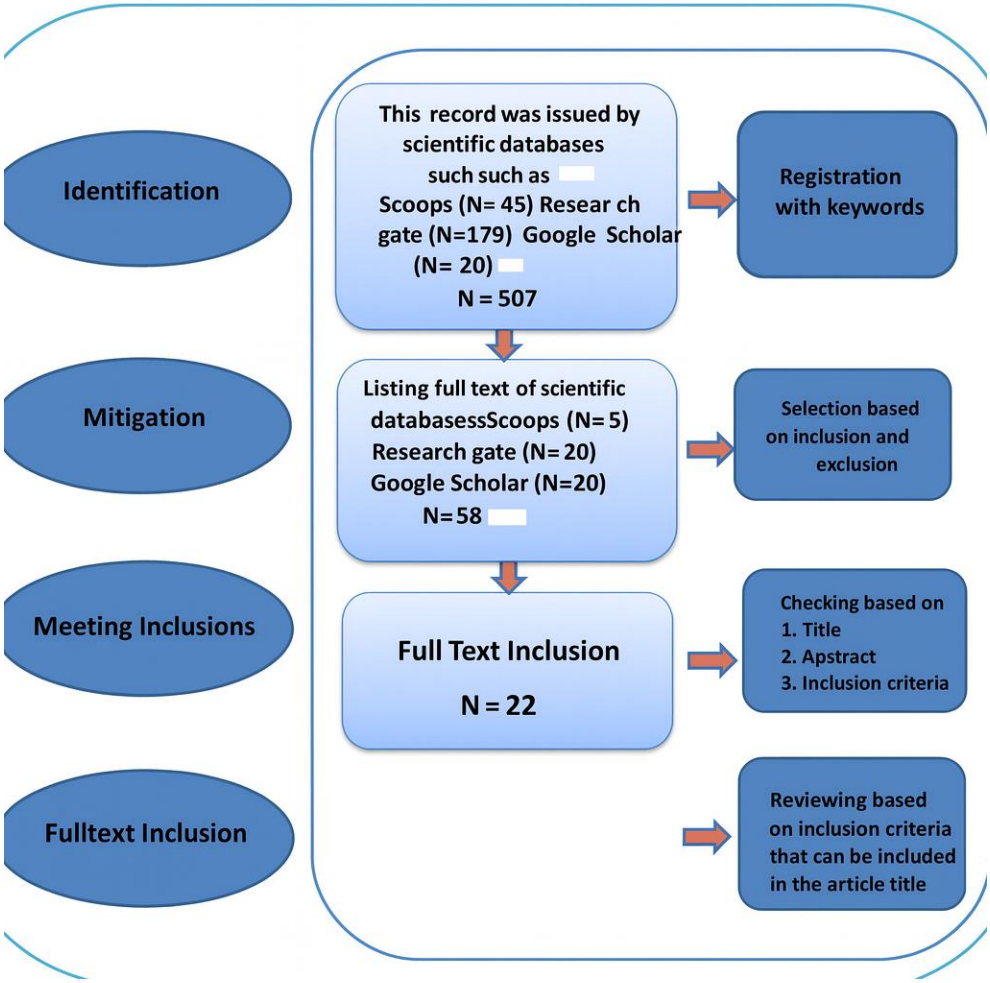


Figure 1. PRISMA Flow Diagram

The data were extracted from the results of the literature review based on the research questions. The research questions focused on the development of future thinking skills. These data can serve as a foundation for teachers and researchers to examine their own studies in the field of future thinking skills.

Article Distribution

The articles were categorized based on year of publication, journal name, indexing, research location, and educational level of participants. The results of mapping the distribution of articles can be seen in Table 4. The results indicate that the highest distribution of articles was in 2023.

Table 4. Meta-results for Future Thinking Skills Outcomes

No.	Reference	Publisher's Journal Indexing	Journal Name	Country	Participants
1	(15)	ResearchGate	26th Scientific Conference on Humanities and Educational Sciences / Faculty of Education / Al-Mustansiriya University	Iraq	University students
2	(26)	ResearchGate	Journal of Positive School Psychology	Iraq	University students
3	(25)	ERIC	Eurasian Journal of Applied Linguistics	Saudi Arabia	Lower secondary school students
4	(29)	ResearchGate	Tasneem Journal of Humanities, Social Sciences, and Legal Sciences	Oman	Science student-teachers
5	(32)	ResearchGate	Journal of Educational and Psychological Sciences	Oman	12th-grade students
6	(35)	ResearchGate	—	Malaysia	—
7	(34)	ResearchGate	International Journal of Future Learning	Finland	High school students
8	(28)	ResearchGate	Egyptian Journal of Psychological Studies	Egypt	University students

9	(36)	Google Scholar	International Journal of Humanities and Social Sciences	Iraq	2nd-year middle school students
10	(37)	Google Scholar	Journal of the Faculty of Education / Wasit University	Iraq	6th-grade primary school students
11	(38)	Google Scholar	Journal of Educational and Psychological Research	Iraq	University students
12	(43)	ResearchGate	Al-Quds Open University Journal of Educational, Psychological Research and Studies	Saudi Arabia	10th-grade students
13	(39)	ResearchGate	International Journal for the Development of Excellence	Bahrain	Undergraduate and postgraduate students
14	(16)	Google Scholar	Journal of the Faculty of Education – Ain Shams University	Egypt	Middle school students
15	(31)	Google Scholar	Journal of the Faculty of Education – Tanta	Saudi Arabia	Secondary school students
16	(44)	Google Scholar	Modern Education Review, USA	China	Middle school students
17	(30)	ERIC	Futures Journal	France	School children aged 8–12 years
18	(34)	ERIC	Journal of Educational Sciences	Finland	High school students
19	(33)	ERIC	Higher Education Studies	Thailand	9th-grade students
20	(15)	Scopus	Baltic Science Education Journal	Malaysia	4th-year secondary school students
21	(40)	Google Scholar	Arab Studies in Education and Psychology Journal	Egypt	Faculty of Education students
22	(45)	Google Scholar	Journal of the Faculty of Education – Benha University	Egypt	High school students

Distribution of Publication Years in Research Articles

The first research question focused on the distribution of publication years from 2014 to 2023. This distribution shows the number of published articles on future thinking skills over the past ten years (Figure 2).

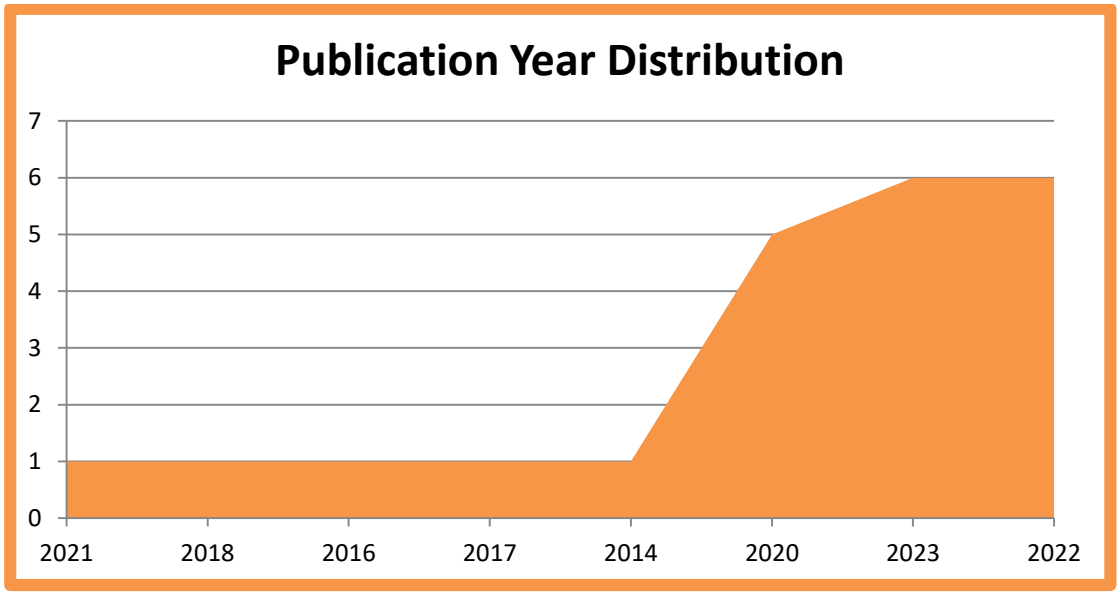


Figure 2. Distribution of Publication Years

The data in Figure 2 show that research related to future thinking skills increased from 2022 to 2023, whereas from 2014 to 2021 (except for a slight growth in 2020) a declining trend was observed. The majority of research was conducted in 2022 and 2023, accounting for approximately 54.5% of the available studies.

Distribution of Publishing Countries in Research Articles

The results focusing on geographical distribution demonstrate the participation of researchers from different countries in the study of future thinking skills. These results were analyzed based on the first author's country affiliation. Most of the research was conducted in the country where the first author was affiliated (the primary country of the researcher).

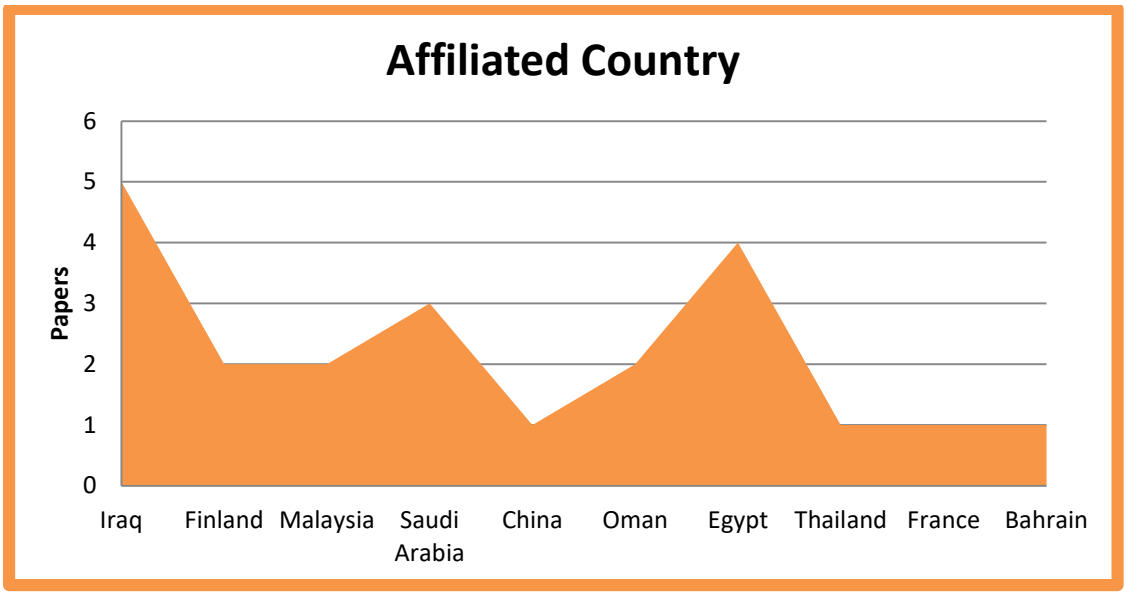


Figure 3. Country of Affiliation of the Author

Figure 3 shows the extent of researcher participation based on country affiliation. Only ten countries have studied future thinking skills over the past decade. This number is very small compared to the total number of countries in the world that should have the capacity to develop these skills. Nevertheless, this research area still holds relatively low research significance. Iraq, with 22.7% of the authors, had the highest contribution to this field, while other countries require greater attention.

One of the key factors in research is the research design, which serves as a framework for research methods and tools to achieve the researcher's objectives. The research design determines how the researcher's thinking approach identifies an appropriate strategy for developing future thinking skills, or what type of data collection tools are used to improve future thinking ability. This design also describes the skills that researchers employ in the data collection process.

Table 5. Types of Methods and Tools Used in the Research Design

Method	Study (Citation)	Research Tool
Quantitative	(15)	Future Thinking Skills Scale
	(26)	Future Thinking Skills Scale
	(25)	Future Thinking Skills Questionnaire
	(29)	A Measure of Future Thinking Skills
	(32)	Future Thinking Skills Questionnaire
	(27)	Future Thinking Test
	(34)	Future Thinking Test Scale
	(28)	Future Thinking Skills Scale
	(36)	Future Thinking Skills Questionnaire
	(34)	Individual Interviews
	(38)	Future Thinking Skills Scale
	(43)	Future Thinking Skills Scale
	(39)	Future Thinking Skills Questionnaire
	(31)	Future Thinking Scale
Qualitative	(16)	Future Thinking Skills Test
	(44)	Future Thinking Scale
	(37)	Future Thinking Skills Test
	(30)	Future Thinking Skills Questionnaire
	(15)	Future Thinking Test
	(40)	Future Thinking Test
	(45)	Future Thinking Skills Scale
Developmental	(33)	Future Thinking Scale

Table 5 shows the research designs and tools used for developing future thinking skills. Quantitative methods, accounting for 63.6%, were the most frequently used. They were followed by qualitative methods at 31.8% and developmental methods at 4.5%. The most widely used research tool was the "Future Thinking Skills Scale." This scale is designed to measure future thinking skills in participants and is used not only in quantitative methods but also in other methods such as qualitative and developmental research.

Skills Used in Research Articles

The results of the literature review reveal a diversity of future thinking skills employed by researchers. Table 6 presents the list of these skills in the analyzed articles. The most commonly used skills include: future-oriented planning, positive thinking, future prediction, future imagination, development of future scenarios, future vision assessment, and future-oriented problem-solving. Some articles also utilized skills such as understanding the current situation, identifying trends, analyzing related driving forces, summarizing future possibilities or needs, and selecting a desirable future with justification. Only one article limited its focus to prediction skills.

Table 6. Skills Applied in Articles

Study (Citation)	Skills Applied in Articles
(15)	Future planning, crisis management, future imagination, prediction, future visualization
(26)	Future planning, future expectations and predictions, constructing mental representations of the future
(25)	Planning, prediction, imagination, problem-solving, future evaluation
(29)	Future planning, solving future problems, predicting the future, future visualization, future vision assessment
(32)	Future planning, solving future problems, imagining the future, predicting the future
(27)	Understanding the current situation, identifying key trends, analyzing related drivers, synthesizing possibilities and needs for the future, selecting a desirable future with justification
(34)	Planning, visualization, prediction, positive thinking, scenario development
(28)	Future planning, positive thinking about the future, predicting the future, future imagination, future scenario development, future vision assessment
(36)	Future planning, predicting the future, solving future problems
(34)	General understanding of the future, expanding awareness of the future, improving thinking skills for the future
(38)	Future planning, imagination, prediction, positive thinking, scenario development
(43)	Future planning, predicting the future, positive thinking about the future, future imagination, future scenario development, future vision assessment
(39)	Future planning, predicting the future, solving future problems
(31)	Future planning, positive thinking, predicting the future, future imagination, future scenario development, future vision assessment
(16)	Future planning, prediction, imagining the future, solving future problems
(44)	Metaphysical elements, reviewing the past and predicting the future, emotion and value, plan construction, predicting changes, critical thinking and decision-making
(37)	Future planning, prediction, future visualization, solving future problems
(30)	Future forecasts, future prediction, temporal perspective
(15)	Understanding the current situation, identifying trends, analyzing related factors, summarizing future possibilities or needs, selecting and justifying a desirable future
(40)	Prediction skills, visualization skills, and future problem-solving skills
(45)	Intuitive prediction, scientific prediction, future problem-solving
(33)	Predicting the future

Objective 1: Systematic Review of Future Thinking Skills in Higher Education (2014–2023)

The results of the systematic review of studies related to future thinking skills in higher education between 2014 and 2023 indicate a relative scarcity of research in this area; among the 507 articles reviewed from academic databases such as ERIC, ResearchGate, and Google Scholar, only 22 relevant studies were identified. This scarcity may be attributed to the following factors:

- Limited prior academic attention to this topic compared to critical and creative thinking skills.

- Lack of standardized tools for measuring future thinking skills, which has made conducting precise quantitative studies difficult.
- Traditional curricular focus on memorization and repetition rather than future-oriented analysis.

However, in recent years—particularly in 2020, 2022, and 2023—there has been a significant increase in the number of published studies in this area. This rise may be due to the impact of the COVID-19 pandemic, which revealed weaknesses in future-oriented planning within educational systems and highlighted the need to develop skills such as forecasting and scenario planning. Additionally, technological acceleration and the emergence of concepts such as artificial intelligence and digital transformation have contributed to increased attention to future thinking. Three Arab countries— Iraq, Egypt, and Saudi Arabia—dominate research production in this field. In Iraq, attention to such research has increased due to declining educational attainment and weaknesses in strategic planning within the educational system. In Saudi Arabia, Vision 2030, which seeks to build a knowledge-based and innovation-driven economy, has led to the inclusion of concepts such as digital transformation and flexible learning in curricula. In Egypt, studies have focused on strategic thinking in the face of economic and demographic challenges. In contrast, other countries' participation has been very limited, with only a few studies from France, Finland, and Thailand being identified. This lack may reflect differences in research priorities, where future thinking is examined under other frameworks such as futures studies or strategic planning.

Most studies have used quantitative methods, relying on questionnaires and pre-test/post-test assessments to measure future thinking skills. Qualitative methods, such as individual interviews and content analysis, rank second. The use of mixed methods (quantitative and qualitative) has been limited, and research and development (R&D) approaches for designing new educational models have been rarely employed. Data collection tools include future thinking skills tests to measure prediction and problem-solving abilities, questionnaires to assess students' awareness of the future, future thinking scales to analyze tendencies toward long-term planning, and individual interviews to explore personal visions of the future.

Objective 2: Classification of Future Thinking Skills

The results of the systematic review show considerable diversity in future thinking skills addressed in educational studies between 2014 and 2023. Most studies focused on a set of core skills, which can be classified into three main categories:

1. **Proactive Skills**

- *Future-oriented planning*: The ability of students to set future goals and outline steps to achieve them. The study by Alqahtani & Elsayed (2023) showed that students skilled in planning achieved GPA scores 22% higher than their peers.
- *Scientific forecasting*: Analyzing current data to predict academic and professional challenges. The study by Rahman (2022) indicated that this skill improved the quality of scientific research by 29%.

2. **Creative Skills**

- *Future imagination*: Visualizing future scenarios beyond traditional frameworks. In the study by Elsayed (2020), imagination helped students design innovative engineering projects with a 78% success rate.
- *Multiple scenario construction*: Designing diverse pathways to face the future. The study by Al-Drabkeh (2017) showed that students trained in this skill demonstrated 34% greater flexibility in problem-solving.

3. **Adaptive Skills**

- *Future-oriented problem-solving*: Developing preventive strategies for potential challenges. According to Hazim (2020), this skill was associated with an 18% reduction in dropout rates.

- *Trend analysis*: Understanding social and technological factors influencing the future. The study by Ilias (2022) found that students excelling in this skill achieved 41% better results in graduation projects.

Objective 3: Impact of Future Thinking Skills on Academic Achievement

The analysis of studies indicates a positive relationship between future thinking skills and students' academic achievement across different levels of education, especially in higher education. Students possessing skills such as future-oriented planning, forecasting, imagining, positive thinking, and future-oriented problem-solving showed better academic performance and higher abilities in self-organization and making informed academic decisions. The study by Salman (2023) emphasized that skills such as planning and crisis management enhance students' academic achievement, while the study by Alqahtani & Elsayed (2023) highlighted the importance of forecasting and imagination in guiding academic decisions.

Furthermore, future thinking fosters student motivation by linking current efforts to desired future outcomes and strengthens their resilience in facing academic challenges. This positive impact extends beyond cognitive aspects to emotional and behavioral domains, such as building self-confidence and broadening aspirational horizons. However, differences in the impact of these skills were observed based on educational level and context, underscoring the need for customized strategies tailored to students' needs.

Discussion and Conclusion

The findings of this systematic literature review provide a comprehensive view of the state of research on future thinking skills within educational contexts between 2014 and 2023. The analysis revealed a relatively limited body of empirical studies addressing these skills, despite their recognized importance in preparing learners for rapidly evolving societal and technological demands (17, 19). Out of 507 initially identified records across key databases, only 22 met the predetermined inclusion and eligibility criteria. This scarcity suggests that, compared to other higher-order cognitive skills such as critical thinking and creativity (2, 3), future thinking has not yet received equivalent research attention.

A notable trend is the sharp increase in research outputs during 2020, 2022, and 2023. This rise can be partly attributed to the global impact of the COVID-19 pandemic, which exposed weaknesses in long-term planning and adaptive strategies in education systems worldwide (7, 23). The necessity for skills such as scientific forecasting, scenario construction, and proactive problem-solving became more visible in both policy and practice, as institutions recognized the need to prepare learners for uncertainty (1, 4). Studies conducted in this period, such as those by (15) and (25), illustrate how educators have begun integrating future-oriented approaches into curricula, particularly in contexts where rapid digital transformation and shifting labor market demands are evident.

Geographically, the review highlights the dominance of three Arab countries— Iraq, Egypt, and Saudi Arabia— in publishing research on future thinking skills (16, 29, 32). This regional emphasis may be linked to specific national initiatives and strategic visions. For instance, Saudi Arabia's Vision 2030 explicitly calls for the development of innovative, knowledge-based economies (38). Research in this context, such as (31) and (28), often integrates future thinking into broader educational reforms aimed at fostering resilience and adaptability in youth. Similarly, in Iraq, studies like (26) and (37) reflect responses to systemic educational challenges by emphasizing scenario-based learning and foresight-driven strategies. Egypt's focus, exemplified by (45) and (36), often addresses future thinking within the framework of sustainable development and environmental awareness.

Methodologically, the reviewed literature shows a strong preference for quantitative approaches (63.6%), with fewer studies employing qualitative (31.8%) or developmental (4.5%) designs (18, 20). Quantitative studies, such as those by (33) and (34), frequently used structured scales or questionnaires to measure future thinking skills, focusing on constructs like forecasting

ability, future-oriented planning, and scenario evaluation. These instruments have contributed to building a foundational evidence base but may lack the nuanced insights that qualitative designs could offer (27). Notably, (34) and (14) demonstrate the value of experiential and participatory learning approaches, where students engage in futures thinking activities embedded in authentic contexts, such as quantum computing or socio-scientific issues.

One of the strongest patterns to emerge is the classification of future thinking skills into three broad categories: proactive, creative, and adaptive skills (4, 12). Proactive skills, including future-oriented planning and scientific forecasting, were frequently linked to improved academic performance and self-regulated learning (25, 35). Creative skills, such as future imagination and multiple scenario construction, supported innovation and problem-solving flexibility (28, 43). Adaptive skills, including trend analysis and future-oriented problem-solving, were often associated with resilience, persistence, and long-term goal orientation (27, 31). This tripartite classification aligns closely with existing theoretical frameworks in futures education, which emphasize the integration of anticipatory, visionary, and strategic competencies (5, 21).

The reviewed studies also suggest a positive correlation between future thinking skills and academic achievement (8, 9). For example, (15) found that crisis management and planning competencies were predictive of improved student performance, while (25) identified forecasting and imagination as key drivers of informed academic decision-making. Moreover, (29) and (16) emphasized the role of these skills in fostering metacognitive awareness, motivation, and self-efficacy. The link between future thinking and affective-behavioral dimensions, such as confidence and aspirational goal setting, is consistent with research in cognitive psychology and educational motivation (7, 24).

However, the impact of specific future thinking skills appears to vary across educational levels and contexts. For instance, (30) observed that scenario-based futures education in French primary schools primarily enhanced creativity and collaboration, while (44) found that secondary students benefited most in terms of critical thinking and structured problem-solving. Similarly, (3) demonstrated that elementary and middle school students could meaningfully engage with futures thinking through multidimensional curricula, but the learning outcomes differed significantly from those of higher education students in studies such as (38) and (26). These differences highlight the importance of tailoring pedagogical strategies to the developmental stage and learning needs of the target population (4, 13).

In addition, cultural and institutional contexts exert considerable influence on how future thinking skills are conceptualized and implemented (6, 11). For example, the integration of future thinking into sustainability education, as explored by (14) and (34), aligns with policy priorities in countries prioritizing climate literacy. Conversely, in contexts emphasizing national economic transformation, such as Saudi Arabia and the UAE, future thinking is often linked to entrepreneurship and innovation ecosystems (25, 32).

Another important insight concerns the interplay between future thinking and other cognitive or affective skills. Studies like (9) and (10) point to synergies between critical thinking, self-worth, and academic resilience in enhancing future-oriented competencies. Similarly, (8) and (24) highlight the role of self-regulation and metacognitive strategies in sustaining long-term engagement with future-focused learning tasks. This suggests that future thinking does not develop in isolation but is part of a broader constellation of skills essential for lifelong learning (1, 2).

While the literature base remains fragmented, the converging evidence supports the integration of future thinking skills into curricula at all educational levels (12, 42). This integration should ideally be holistic, combining cognitive, affective, and behavioral elements, and supported by both formal instruction and experiential learning opportunities (40, 41). Furthermore, emerging research underscores the potential of digital tools, socio-scientific inquiry, and interdisciplinary projects to make futures education more engaging and impactful (14, 35).

This review is constrained by the availability and accessibility of open-access literature, which may have excluded relevant studies published in subscription-based journals. The inclusion criteria limited the search to English and Arabic publications, potentially omitting significant work in other languages. Additionally, the reliance on keyword-based searches may have missed studies that address future thinking indirectly under different terminologies, such as foresight, anticipation, or strategic planning. Methodological diversity across the reviewed studies—particularly in measurement tools and operational definitions of future thinking—also complicates direct comparisons and synthesis of findings.

Future research should aim to develop standardized, validated instruments for measuring future thinking skills across diverse educational contexts. Longitudinal studies are needed to examine the developmental trajectory of these skills from early education through adulthood. Greater emphasis should be placed on mixed-methods research to capture both the quantitative outcomes and the qualitative nuances of learning processes. Cross-cultural comparative studies could provide deeper insights into how sociocultural factors shape the acquisition and application of future thinking. Finally, intervention-based research should explore how technology-enhanced learning environments, such as virtual simulations or AI-driven scenario planning, can facilitate skill development.

Educators should embed future thinking skills into core curricula rather than treating them as supplementary activities. Instructional strategies should balance explicit teaching of planning and forecasting skills with opportunities for creative exploration and adaptive problem-solving. Professional development programs for teachers should include training on integrating futures-oriented pedagogy into subject-specific contexts. Partnerships between educational institutions, industry, and policy bodies can provide authentic, real-world scenarios for students to apply these skills. Lastly, assessment frameworks should evolve to evaluate not only knowledge acquisition but also the capacity to envision, plan, and act toward desirable future outcomes.

Acknowledgments

We would like to express our appreciation and gratitude to all those who helped us carrying out this study.

Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adheried in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

References

1. Slaughter R. Futures for the 3rd Millenium: Enabling a forward view prospect. Sydney: Prospect Media; 1999.
2. Torrance E. The Millennium: A Time for Looking Forward and Looking Back. 2003;15(1):6. doi: 10.4219/jsge-2003-442.
3. Vidergor HE. Promoting Future Thinking in Elementary and Middle School Applying the Multidimensional Curriculum Model,thinking skills and creativity. 2019;31(1):19-30. doi: 10.1016/j.tsc.2018.10.001.
4. Hafez IH. Future Thinking (Concept - Skills - Strategies). Cairo, Egypt: Dar Al-Ulum for Publishing and Distribution; 2015.
5. Torrance EP. Creativity and Futurism in Education: Retooling Education 1980. Available from: http://www.E.P.Torr.com/ew/vol-.
6. Torrance EP. Participating teachers evaluate the Future Problem Solving Program. 1999;31(2):21-33.
7. Alabdullah M, Agha QQ, Abdullah MK. Building Academic Resilience Through Positive Thinking: A Study of University Students in Syria. Asian Journal of Education and Social Studies. 2025;51(1):280-92. doi: 10.9734/ajess/2025/v51i11747.
8. Mohkam Kar A, Shaterian F, Nikookar A. Effectiveness of Critical Thinking Education on Divergent Thinking and Academic Enthusiasm of High School Students. Iranian Journal of Educational Sociology. 2024;7(1):141-9. doi: 10.61838/kman.ijes.7.1.14.
9. Emesi KE, Anyanwu AN, Ezenwosu EN. Examining Students' Mental Toughness, Self-Worth and Critical Thinking Skill as Predictors of Academic Achievement in Mathematics in Anambra State, Nigeria. European Journal of Contemporary Education and E-Learning. 2024;2(1):88-102. doi: 10.59324/ejceel.2024.2(1).08.
10. Ganjifard M, Jafar Tabatabaei SS, Jafar Tabatabaei TS, Shahabizadeh F. Comparison of the Effectiveness of Problem-Solving Approach-Based Training and Critical Thinking Training on Reducing Academic Self-Handicapping Behaviors and Academic Procrastination in Nursing Students with Test Anxiety. Journal of Assessment and Research in Applied Counseling (JARAC). 2024.
11. Nabil A. Challenges of the Information Age. Cairo: Egyptian Book Authority; 2003.
12. Minas AH. Schools of the Future (Present Responses to Future Transformations,Curriculum and the Inevitability of Change)2005.
13. Alister Jones.et a. Developing students futures thinking in science education. Research in Science Education. 2011. doi: 10.1007/s11165-011-9214-9.
14. Laherto ART. Facilitating transformative science education through futures thinking. THE INTERNATIONAL JOURNAL OF LEARNING FUTURE. 2022.
15. Salman B. Psychological capital and its relationship to future thinking among university students. 2023.
16. Nasha SM. A Suggested training program in science based on the principals of the social constructivism theory to develop the sustainable consumption and the future thinking skills for the preparatory school students. Journal of the Faculty of Education in Educational Sciences - Ain Shams University. 2023(47 (Part One)).
17. Mengist WS. Method for conducting systematic literature review andmeta-analysis for environmental science research. MethodsX. 2020;7:100777. doi: 10.1016/j.mex.2019.100777.
18. Mengist w. Historical Development of Environmental Management Tools and Techniques: A Review Paper on Its Driving Forces. International Journal of Energy and Environmental Science. 2020;5(5):90-100. doi: 10.11648/j.ijees.20200505.12.

19. Moher D. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Ann Intern Med. 2009;151:264-9. doi: 10.7326/0003-4819-151-4-200908180-00135.

20. Moher DS. Preferred reporting items for systematic review and meta-analysis protocols (prisma-p) 2015 statement. Systematic Revview. 2015;4(1). doi: 10.1186/2046-4053-4-1.

21. Abu Safieh LA. The effectiveness of a training program based on solving future problems among a sample of tenth grade female students in Zarqa: University of Jordan, Faculty of Graduate Studies; 2010.

22. AlShafey GA. The effectiveness of a proposed course in environmental sciences based on problem-centered learning in developing future thinking skills and environmental awareness among students of the Faculty of Education, Helwan University, Basic Education Department. Journal of Arab Studies in Education and Psychology. 2014(46). doi: 10.21608/saep.2014.50119.

23. Choi JA, Yang J. The Role of Should-Thinking on the Academic Procrastination Process of High Achievement Motivators. Korean Association for Learner-Centered Curriculum and Instruction. 2024;24(1):1-17. doi: 10.22251/jlcci.2024.24.1.1.

24. Choi JA, Yang J-Y. The intrapsychic process of academic procrastination: How should-thinking aggravates self-regulatory failure. Learning and Individual Differences. 2024;109:102397. doi: 10.1016/j.lindif.2023.102397.

25. Alqahtani M, Elsayed SA. Degree of Intermediate School Teachers' Possession of Future Thinking Skills in light of (PISA) Test Dimensions in Mathematics and Arabic Language. Eurasian Journal of Applied Linguistics. 2023;9(3):83-95.

26. Karim AK, Thamer SK. Future thinking among medical group students. Journal of Positive School Psychology. 2022;6(4):9213-24.

27. Ilias A. DEVELOPMENT OF FUTURE THINKING TEST INSTRUMENT FOR. International Journal of Education,Psychology and Counseling. 2022;7(47):337-53. doi: 10.35631/IJEPC.747029.

28. Elsayed NAe. The effect of the interaction between meta-emotion and educational level on future thinking skills among Faculty of Education students at Al-Azhar University in Cairo. Egyptian Journal of Psychological Studies. 2020;30(109).

29. Al-Ma'ramiyah Sb, Ambo Saeedi A, Ali H, Yusra J. The degree of possession of future thinking skills by science student teachers at Sultan Qaboos University. Tasnim Journal of Humanities, Social and Legal Sciences. 2023.

30. Julien MP, Chalmeau R, Mainar CV, Léna JY. An innovative framework for encouraging future thinking in ESD: A case study in a French school. Futures. 2018;101:26-35. doi: 10.1016/j.futures.2018.04.012.

31. Hazim kA. Future thinking among gifted and ungifted female students in Al-Ahsa city. Journal of the Faculty of Education - Tanta. 2020;79(Third, Part First).

32. Al-Kharousi IK. Future Thinking among twelfth grade students in Government schools in Sultanate of Oman in Light of Some Variables. Journal of Educational and Psychological Sciences (JEPS). 2023;7(45).

33. Phusee-orn S, Pongteerawut S. The 9th Graders' Relation of Futuristic Thinking Factors Study. Higher Education Studies. 2022;12(3):134. doi: 10.5539/hes.v12n3p134.

34. Rasa T, Palmgren E, Laherto A. Futurising science education: students' experiences from a course on futures thinking and quantum computing. Instructional Science. 2022. doi: 10.1007/s11251-021-09572-3.

35. Siew NRMS. EFFECTS OF SOCIO-SCIENTIFIC ISSUES BASED ON THINKING MAPS APPROACH ON FUTURE THINKING OF SECONDARY SCHOOL STUDENTS. Journal of Baltic Science Education. 2022.

36. Walaa DK, Hadi KS. The Effect of Using The Strategy of Graduated Activities on Future Thinking among Second Grade Intermediate Students in The Science Subject. International Journal of Humanities and Social Sciences. 2020(16):162-74. doi: 10.33193/IJoHSS.16.153.

37. Younis WM, jardo hA. The effect of snowball strategy on the scientific sense and future thinking of sixth-graders in elementary science. Journal of the College of Education / University of Wasit. 2021(43).

38. Al-Ali MH, Hussein SI. Future thinking skills for university students. Journal of Educational and Psychological Research. 2020;17(67).

39. Al-Qahtani SM. The level of application of future thinking skills among students of the Arab Gulf University "theory and application". International Journal for the Development of Excellence. 2020.

40. AlShafey GA. The effectiveness of a proposed course in environmental sciences based on problem-centered learning in developing future thinking skills and environmental awareness among students of the Faculty of Education, Helwan University, B2014.

41. Hanfy S. The effect of using some logical and deductive intelligence strategies and philosophical concepts among secondary school students in Egypt. Journal of the Faculty of Education, Beni Suef University. 2007.

42. Timothy D. Managing Heritage and Cultural Tourism Resources, Critical Essays. Ashgate. 2007;1.

43. Al-Drabkeh MMK. Future Thinking Skills of Gifted and Non-Gifted Students - A Comparative Study. Al-Quds Open University Journal of Educational and Psychological Research and Studies. 2017. doi: 10.5281/zenodo.1404646.

44. Tsai MY, Lin HT. The Effect of Future Thinking Curriculum on Future Thinking and Creativity of Junior High School Students. Journal of Modern Education Revie, USA March 2016. 2016;6(3):176-82. doi: 10.15341/jmer(2155-7993)/03.06.2016/004.

45. Imam SA. The effectiveness of a proposed program based on green education principles in developing future thinking skills and environmental awareness among secondary school students. Journal of the Faculty of Education, Benha. 2023.