

# Young children's attitudes toward science learning in early learning grades

Rommel AlAli

*The National Research Center for Giftedness and Creativity, King Faisal University, Al-Ahsa, Saudi Arabia, and*

Ali Al-Barakat

*Department of Education, University of Sharjah, Sharjah, United Arab Emirates and*

*Department of Curricula and Teaching Methods, Yarmouk University, Irbid, Jordan*

## Abstract

**Purpose** – This research aims to investigate the attitudes of young children toward learning science in the early educational grades.

**Design/methodology/approach** – The study involved conducting interviews with seventy-three children attending institutions in Sharjah, United Arab Emirates. The structured interview method was employed to collect valuable data.

**Findings** – The findings of the interviews shed light on the inclination of young children to foster positive attitudes toward science education. These inclinations include the facilitation of knowledge acquisition that enables children to develop skills for applying scientific concepts in real-life contexts, the incorporation of hands-on activities both inside and outside the classroom, and the prioritization of child-centered approaches to learning.

**Originality/value** – This research aims to explore the attitudes of young children in early educational grades toward learning science. Interviews were conducted with seventy-three children in Sharjah, UAE, using a structured interview method. The findings highlight children's inclination toward positive attitudes in science education, including the importance of knowledge acquisition for applying scientific concepts in real-life contexts, hands-on activities inside and outside the classroom, and child-centered learning approaches. Based on these findings, the study provides recommendations and conclusions to enhance science education experiences for young children.

**Keywords** Young children, Attitudes, Learning science, Early educational grades, Structured interview method

**Paper type** Research paper

## Introduction

The significance of attitudes toward learning in science has been widely recognized in research studies. These studies consistently show a relationship between attitudes toward science and students' academic performance (Bakker and Telli, 2023; Damianus *et al.*, 2023; Madina, 2024; Potvin and Hasni, 2014). This indicates that young children who have attitudes toward learning science are more likely to maintain their interest in subjects they find enjoyable (Bakker and Telli, 2023; Javed *et al.*, 2020).

Science education should go beyond acquiring knowledge. It should also aim to shape the behavior of children by transferring this knowledge (Bakker and Telli, 2023; Kerr and



Murphy, 2012). Bakker and Telli (2023) emphasize that a child's attitude toward their school education can have an impact on their future than the knowledge they gain in school. Therefore, attitudes toward teaching and learning science play a contribution as they can influence and guide children's behavior in a variety of ways (Abun *et al.*, 2018, 2021; Banaji and Heiphetz, 2010). In this context, Potvin and Hasni (2014) emphasize that encouraging children to develop attitudes toward science education is of utmost importance, as it can significantly impact their future ambitions and engagement in scientific fields.

From a social psychology standpoint, attitudes hold importance as they can help explain behavior (Banaji and Heiphetz, 2010). Attitudes can be defined as the driving force that transforms knowledge and skills into action as the willingness to use scientific methods (Alali and Al-Barakat, 2023a; Ajzen and Fishbein, 2015; Al Furaikh *et al.*, 2017). According to educationalists (Abun *et al.*, 2021; Albarracín *et al.*, 2005), attitudes are generally perceived as a state of readiness reflecting a tendency to react in a way when confronted with stimuli. To provide clarity Ajzen and Fishbein (2015), and Al Furaikh *et al.* (2017) describe attitudes as a statement that expresses a viewpoint, belief, preference, judgment, emotional sentiment or position either in support of or, against something. Attitudes play a contribution in shaping behaviors and are crucial in understanding how individuals respond to and engage with various stimuli and situations (Albarracín *et al.*, 2005; Al Furaikh *et al.*, 2017).

On a scale, fostering attitudes among learners is acknowledged as one of the primary goals of science education. For example, research conducted with teachers revealed that promoting attitudes among students was ranked among the four objectives of practical work (Alali and Al-Barakat, 2023b; Bakker and Telli, 2023; Frenzel *et al.*, 2021; Van Griethuisen *et al.*, 2015).

Numerous experts in the field of science education have emphasized the importance of cultivating positive attitudes toward learning science in children as a fundamental basis for their success (Drymiotou *et al.*, 2021; Drymiotou *et al.*, 2021; Emvalotis and Koutsianou, 2018). This endeavor contributes to nurturing curiosity and scientific exploration, equipping children with the readiness to explore diverse scientific domains and develop a deeper understanding of them. Moreover, fostering positive attitudes in children enhances their self-confidence, as they perceive themselves as capable of comprehending scientific concepts and solving problems (AlAli and Al-Barakat, 2023c; Drymiotou *et al.*, 2021).

From a constructivist standpoint, Al-Barakat *et al.* (2023) assert that the development of attitudes plays a significant role in promoting critical thinking, enabling children to engage in thoughtful analysis and objective evaluation of scientific information. This, in turn, stimulates creativity and innovation, as children with positive attitudes toward learning science become more receptive to new experiences and inclined to generate creative solutions to problems, thus expanding their learning opportunities and potential career paths. By fostering positive attitudes toward learning, children are empowered to explore diverse paths in science, technology, engineering and mathematics (STEM) fields (AlAli and Al-Barakat, 2023a, b, c; McDonald, 2016).

Building positive attitudes toward learning science necessitates collaborative efforts at multiple levels, involving families, schools and the broader community. By creating a supportive and stimulating environment that encourages curiosity and exploration, these positive attitudes can be reinforced, leading to tangible outcomes in children's science education (AlAli and Al-Barakat, 2023b).

Previous research (Javed *et al.*, 2020; Potvin and Hasni, 2014) emphasized the exploration of children's attitudes toward science education and the promotion of favorable scientific attitudes among young learners. Educational reforms worldwide commonly recognize that science education should aim to develop attitudes, knowledge and skills as components of a child's rounded personality (Drymiotou *et al.*, 2021; Emvalotis and Koutsianou, 2018; Potvin and Hasni, 2014; Javed *et al.*, 2020; Zubair and Nasir, 2011).

Developing attitudes, in children toward subjects is widely recognized as an important and desirable educational goal (Drymiotou *et al.*, 2021; Emvalotis and Koutsianou, 2018). Nemours

researchers (Díez-Palomar *et al.*, 2020; Mao *et al.*, 2021) emphasize the significance of learners forming attitudes toward school subjects for three reasons. First, these attitudes have an impact on achievement and contribute to cognitive development. Second, students who possess attitudes toward a subject are more likely to engage in further learning in that field. Finally, throughout their lives, individuals often convey their attitudes toward subjects to their peers.

Although the cultivation of attitudes toward science is of great significance, the current body of literature on attitude development remains limited and fragmented, primarily due to several factors that exert a substantial influence on students' attitudes (Damianus *et al.*, 2023; Madina, 2024). Some studies (Drymiotou *et al.*, 2021; Emvalotis and Koutsianou, 2018; Potvin and Hasni, 2014; Javed *et al.*, 2020) have concluded that children's perceptions and attitudes toward science relevance in their lives greatly impact their attitudes toward the subject. Children tend to develop an affinity for science when they believe it holds importance in their experiences. Moreover, many researchers (Osborne *et al.*, 2010; Ajzen and Fishbein, 2015; Al Furaikh *et al.*, 2017) have discovered a correlation between attitude formation and effective teaching methods utilized in the classroom.

In a study conducted by Sshana and Abulibdeh (2020), it was observed that students who received instruction through hands-on laboratory methods demonstrated more positive attitudes compared to those taught using lecture demonstration techniques. Additionally, previous research has highlighted the influential roles of the science classroom environment and teaching approaches in shaping students' attitudes (AlAli and Al-Barakat, 2023a; Van der Vleuten *et al.*, 2018).

Additionally, the influence of family background on children's inclination toward learning science is widely recognized (Buckingham *et al.*, 2013; Bergen *et al.*, 2016). It plays a significant role in shaping students' performance at all grade levels (Bergen *et al.*, 2016). Various research studies (Buckingham *et al.*, 2013; Bergen *et al.*, 2016; Fuqin and Yiwen, 2014; Li and Qiu, 2018) have demonstrated the impact of family background on children's experiences within schools. It is generally acknowledged that the quality of family interactions correlates with children's motivation and achievements in academics (Buckingham *et al.*, 2013; Bergen *et al.*, 2016). For example, studies (Buckingham *et al.*, 2013; Bergen *et al.*, 2016; Chetty *et al.*, 2011) have highlighted a strong association between family involvement in education and the attainment of educational goals by children. This underscores the importance of familial support in helping children achieve their aspirations.

Furthermore, several studies (AlAli and Al-Barakat, 2023c; Al-Hassan *et al.*, 2023; Collins and Osborne, 2000; Fraihat *et al.*, 2022; Vel Žabik *et al.*, 2021) have revealed that the familial environment significantly contributes to shaping children's attitudes toward science education. This emphasizes how a family's cultural and scientific background influences the cultivation of attitudes among learners.

Additionally, it is widely acknowledged that the engagement and interest of children play a crucial role in shaping their attitudes and development (AlAli and Al-Barakat, 2023b; Anderhag *et al.*, 2016; Kerr and Murphy, 2012). Various studies highlight the importance for educators to adopt science teaching methods that align with the interests of children. Research in education (Potvin and Hasni, 2014; Javed *et al.*, 2020; Khasawneh *et al.*, 2023; Tytler *et al.*, 2008) has consistently shown that when students do not find pleasure or enjoyment in learning science, it hampers the growth of positive attitudes toward science education. Potvin and Hasni (2014) argue that teachers have a responsibility to address children's curiosity and passion for learning technological subjects, as it directly impacts their academic achievements and their inclination to pursue studies and careers in scientific fields.

Drawing from the preceding discussion, the emphasis placed on cultivating interest arises from its substantial impact on children's level of engagement with the subject matter (Al-Barakat *et al.*, 2022; Bani Irshid *et al.*, 2023; Shaer *et al.*, 2019). Extensive research, encompassing various studies (Ajzen and Fishbein, 2015; Al Furaikh *et al.*, 2017; Anderhag

*et al.*, 2016; Potvin and Hasni, 2014), examining students' attitudes toward science consistently indicates a declining trend in their interest levels. Several studies have shown that although students initially express interest and enthusiasm toward science, they often feel disconnected from the subject and find it difficult to relate concepts to practical aspects of life (Tytler *et al.*, 2008). This decline in attitudes toward science is noticeable from the early years of schooling (Bakker and Telli, 2023; Kerr and Murphy, 2012) and continues into secondary education (Al-Barakat *et al.*, 2023; Anderhag *et al.*, 2016; Khasawneh *et al.*, 2022; Osborne *et al.*, 2010).

### *Study context*

Promoting an interest in learning science among children has received significant attention in science curriculum reforms, particularly in the United Arab Emirates (UAE). The UAE recognizes the cultivation of interest in learning science as a crucial element in developing scientific thinking skills from an early stage (Ministry of Education, 2024a). As a result, the educational policies in the UAE aim to integrate technology and innovation into the curriculum to foster positive attitudes toward learning science. Advanced scientific methodologies encompassing physics, chemistry, biology and general sciences are incorporated, and the curricula are regularly updated to align with global advancements and meet local market demands. Moreover, the UAE Ministry of Education highlights the importance of engaging schools in experimental and interactive education through scientific experiments and practical activities. To support this type of learning, schools are equipped with state-of-the-art laboratories and tools (Ministry of Education, 2015, 2024a; Sharjah Private Education Authority, 2024).

In the field of education, technology plays a significant role, with the extensive utilization of tablets and interactive educational software to facilitate the understanding of scientific concepts. These tools are designed to make education more captivating and engaging for children. Furthermore, projects and activities are implemented to encourage children's participation in scientific endeavors and local and international competitions, such as robotics and science and innovation contests, which enable them to apply their knowledge in real-life situations (Ministry of Education, 2024b).

Considering the aforementioned points, the educational reform movement in the UAE places considerable emphasis on nurturing attitudes toward science, which is identified as a key objective by local educators (Shaer *et al.*, 2019). In this regard, the UAE Ministry of Education emphasizes that fostering positive attitudes toward learning science not only enhances a child's academic knowledge but also significantly contributes to their personal growth and the development of their social and psychological skills (Ministry of Education, 2024a, b). It also helps inculcate scientific values in children, such as objectivity, accuracy and perseverance. These values contribute to the formation of a well-rounded personality capable of tackling challenges with scientific ethics. The UAE's national strategic plan further highlights that instilling scientific values and attitudes in children from an early age plays a pivotal role in empowering them to confront scientific challenges and apply concepts in various situations, thereby fostering the development of systematic and logical problem-solving skills (Makhmasi *et al.*, 2012; Soomro, 2019; The Economist Intelligence Unit, 2014).

Considering the prevailing national trends in the UAE, which emphasize the importance of promoting children's engagement with science from the early grades, there is a compelling requirement to conduct this study within the Emirati context. Therefore, the rationale for the present study is as follows:

- (1) The study aims to contribute to the identification of motivations that generate children's interest in science, as well as the barriers that hinder their attraction to this subject. Such understanding can be instrumental in developing more effective educational strategies to capture children's interest and guide teachers in designing innovative lessons that foster participation and exploration in science classes.

- (2) This study seeks to comprehend the positive and negative attitudes of children toward learning science, which can inform the development of support programs and educational interventions tailored to enhance children's academic performance, particularly for those facing challenges in this subject.
- (3) Conducting this study will provide crucial data for educational policymakers to formulate plans and programs that encourage science education. This may involve allocating additional resources to schools, providing teacher training and developing innovative educational initiatives.

Overall, conducting the present study not only contributes to the advancement of science education but also holds far-reaching implications for society as a whole. By preparing a generation capable of critical thinking, innovation and active contribution to addressing the complex challenges faced by the world, the study contributes to broader societal progress.

#### *Statement of the study*

While numerous studies have investigated students' attitudes toward science on a global scale, limited research has been conducted in the UAE, particularly in the context of early grades. Addressing this research gap, the present study aims to examine, explore and enhance the attitudes of young children (ages 5–8 years) toward learning science in UAE schools. The early education stage is a critical period for attitude development, and it is noteworthy that no existing studies have specifically explored this area within UAE schools. By focusing on this specific age group in the UAE educational context, the study seeks to provide valuable insights into the factors influencing young children's attitudes toward science education and to inform strategies for fostering positive attitudes in this crucial developmental phase.

Importantly, [Ajzen and Fishbein \(2015\)](#) highlight that young children tend to exhibit the most positive attitudes toward science, further emphasizing the significance of investigating attitudes in the early grades. This study's uniqueness lies in its examination of young children's attitudes during these formative years, as these attitudes greatly influence their future perspectives on science education. Moreover, this study's findings will provide insights into the extent to which the goals of the Emirati educational reform movement have been achieved. The reform movement emphasizes the importance of nurturing positive attitudes toward science teaching among children ([Shaer et al., 2019](#)). Hence, the principal objective of this study is to comprehensively examine and improve the attitudes of young children toward learning science during the early educational grades.

To achieve this, the study aims to address the following research question: What are the prevailing attitudes toward learning science in the early educational grades? By delving into this inquiry, the study will provide a deeper understanding of young children's perspectives on science education and identify effective strategies for promoting positive attitudes toward learning science during the formative years of education.

#### **Study procedure**

##### *Participant selection*

The research concentrated on children in the early childhood education grades, specifically targeting those aged between 4 and 6 years, in the educational directorates of Sharjah, UAE. Sharjah was selected as the study site due to its status as an independent emirate with its own distinct educational system. The sample population was drawn from diverse cultural and social areas, encompassing both urban and rural regions, to ensure adequate representation of the study's target population. It is worth highlighting that children were chosen as

participants for the sample due to their enhanced ability to express their attitudes, particularly since attitudes were measured directly by the children themselves, rather than relying on assessments from others. This age range was selected because it signifies a pivotal stage toward primary education, where subject-specific teachers are commonly engaged, departing from the domain of early childhood education teachers.

A total of seventy-three young children from lower grades were randomly chosen to participate in comprehensive interviews. The demographic characteristics of the study sample are presented in [Table 1](#).

Each child participated in an extensive interview lasting approximately thirty-five minutes. This selection aimed to gather comprehensive insights into the experiences and perspectives of children during this critical developmental phase.

### *Interview design and implementation*

While most research on attitudes toward science education utilizes quantitative approaches, this study adopted a qualitative approach, employing interviews. According to [Bell \(2014\)](#), qualitative research allows for a deeper exploration of individuals' inner feelings. Interviews were deemed appropriate for measuring children's attitudes toward science, particularly as some children in this age group may face challenges expressing their feelings through questionnaires due to limited reading and writing abilities ([Bell et al., 2022](#)).

The purpose of the interview questions was to gather information, about how teachers influence children's attitudes toward science. We compiled a set of twenty-five negative questions. Presented them to the children in a random order during the interviews. These questions aimed to assess how the children perceive the importance of science in their lives their level during science lessons their attitudes toward practical activities in the science lab and their thoughts on how challenging it is to learn science.

To ensure that the interview questions were valid and clear a group of seven experts reviewed them. The final version of the interview included seventeen questions. To ensure that they were clear and suitable for participants we tested these questions with thirteen children beforehand. Additionally, we included slightly different versions of questions throughout the interview process to maintain consistency, in children's responses.

### **Data analysis**

In the data analysis phase of the study, the researchers employed a grounded theory approach. Grounded theory is a qualitative research method that involves systematically analyzing data to develop theories or concepts grounded in the participants' experiences and perspectives. It allows for the emergence of themes, patterns and relationships from the data rather than imposing preconceived notions or theories.

Variables	Variable levels	No	Percentage
Gender	Male	37	50.68%
	Female	36	49.32%
Academic performance	Excellent	13	17.80%
	Very Good	20	27.39%
	Good	23	31.50%
	Below average	17	23.28%
Cultural and social environments	Urban	38	52.05%
	Rural	35	47.95%

**Source(s):** Created by author

**Table 1.**  
Demographic  
characteristics of the  
study sample

The interviews conducted with the children were recorded using audio recording devices, ensuring that the researchers captured their responses accurately. The recorded interviews were then transcribed verbatim, meaning that the spoken words were transcribed exactly as they were spoken. This transcription process ensured that the researchers had a written record of all the information provided by the participants. The transcripts served as the primary source of data for analysis. The researchers thoroughly examined the transcripts, reading and re-reading them to identify recurring themes, ideas and patterns related to the contribution of teachers in shaping children's attitudes toward science. They engaged in a process of coding, which involved categorizing and labeling segments of the data that were relevant to the research question. As the analysis progressed, the researchers compared and contrasted different codes and identified relationships between them. They continually sought to refine and develop their understanding of the data, allowing new insights and concepts to emerge. The goal was to generate a comprehensive understanding of the contribution of teachers in fostering positive attitudes toward science among young children.

Throughout the analysis, the researchers selected specific excerpts from the transcriptions that encapsulated key points or provided illustrative examples of the identified themes. These verbatim quotes were later used in the presentation of the study's findings to provide evidence and support for the conclusions drawn from the analysis.

#### *Ethical issues in the study*

To ensure the objectivity of the study and uphold the rights of the children, various considerations were taken into account due to their age being under 18 years old. The following procedures were implemented in this study:

- (1) Guardian consent (Parental Consent): Official consent documents were obtained from the parents or guardians of each child in the sample, ensuring their approval for the child's participation in the study.
- (2) Confidentiality of information: The personal information of the children was treated as confidential, and their identities were protected. No information that could identify an individual child was disclosed in the study without prior consent from the parents or guardians.
- (3) Safety and care assurance: A secure and protected environment was provided for the participating children. The interview process took place in a separate location within the school, where necessary care and assistance were available to ensure the well-being of the children.
- (4) Respect for children's choices and wishes: The choices and wishes of the children were respected throughout the study. They were guided in a supportive and respectful manner to participate voluntarily, without any form of coercion or threats. Furthermore, the decision of a child not to participate or to withdraw from the study was also respected.

#### **Findings and discussion**

Upon the initial analysis of the data, it became evident that participants exhibited positive attitudes toward learning science, a noteworthy observation credited to the positive influence of early childhood teachers. These influences can be categorized into four distinct areas, as presented in [Table 2](#):

Each of these categories was elucidated and discussed comprehensively below.

*First, activating the child's role as the focal point of science learning*

The participants emphasized the importance of childhood education teachers adopting a child-centered approach to science learning. They observed that these teachers create a supportive and inclusive classroom environment where children's interests, ideas and questions are valued and incorporated into the learning process. By encouraging open-ended inquiry, critical thinking and problem-solving, childhood education teachers empower children to take ownership of their learning, fostering a positive attitude toward science and promoting lifelong learning skills.

The analysis of children's responses revealed that 80.82% of them emphasized their enjoyment of science classes due to the supportive learning environment provided by their teachers, which prioritizes the learners themselves. Some of their perspectives were expressed as follows:

I derive immense enjoyment from my science classes as the teacher prompts me with questions, allowing me the chance to ponder and furnish answers.

I have a deep appreciation for science lessons because my teacher consistently offers feedback during each class.

I value science classes because my teacher encourages hands-on activities, dedicating sufficient time to train me in articulating and elucidating my thought processes.

I find joy in science lessons as my teacher actively engages me in classroom activities.

I favour science classes over other subjects because the questions posed in science classes prompt me to think critically.

I desire longer science lessons because the topics discussed in class contribute to our potential as future scientists. I find joy in science learning as it empowers me to analyse and make informed judgments on various matters.

These quotes demonstrate how children's positive attitudes toward science classes are influenced by their enjoyment of science teaching and learning. Based on their perspectives there are reasons why these positive attitudes develop. First, teachers encourage participation by allowing children to answer questions during classroom interactions. Second, they provide feedback on the students learning progress. Third, they focus on child-centered learning by emphasizing the development of process skills. Fourth, teachers acknowledge differences among children that go beyond what's covered in science textbooks. Finally, they promote knowledge production through creative thinking. All of these factors highlight that children are seen as contributors to knowledge rather than just passive recipients, which in turn fosters attitudes toward science learning.

No	Categories	Frequencies	Percentages %
1	Activating the child's role as the focal point of science learning	59	80.82
2	Utilizing hands-on activities for science learning	64	87.67
3	Encouraging children to apply scientific process skills in real-life situations	66	90.41
4	Empowering young children to acquire scientific knowledge independently	73	100

**Source(s):** Created by author

**Table 2.**  
Frequencies and percentages of qualitative analysis results according to analysis categories

As a result, this aspect of the study examines how much children enjoy science classes and indicates that effective classroom behaviors exhibited by primary education teachers play a contribution to fostering this enjoyment. These behaviors suggest that primary teachers possess the qualifications and confidence to teach children effectively. This finding supports the idea that teachers' actions, in the classroom greatly influence students' attitudes (Potvin and Hasni, 2014; Javed *et al.*, 2020; Tytler *et al.*, 2008).

Moreover apart, from the factors mentioned earlier, it is clear that the interest in science classes can be attributed to the impact of teachers who encourage hands-on activities and prioritize a child-centered approach to learning. Simon and Connolly (2020) emphasizes that incorporating laboratory work can nurture learners' interest in science classes.

Based on the findings presented, the influential factor that positively affects children's attitudes toward science is the teaching practices employed by early childhood education teachers. All children expressed a shared sentiment that science is a subject. The researchers believe that this feeling, which influences children's attitudes can be attributed to how science is taught with an emphasis on knowledge rather than abstract concepts. This finding aligns with studies (Damianus *et al.*, 2023; Madina, 2024; Haber, 2020) which emphasize that fostering positive attitudes toward science among children depends on the instructional approach rather than solely on the inherent nature of the subject itself.

#### *Second, utilizing hands-on activities for science learning*

The participants acknowledged the contribution of childhood education teachers in utilizing hands-on activities as a primary instructional approach for teaching science. They noted that these teachers actively engage children in hands-on experiments, demonstrations and group projects, enabling them to interact directly with materials, manipulate objects and collaborate with their peers. This experiential learning approach fosters a deeper understanding of scientific concepts and cultivates a positive attitude toward science through active participation and exploration.

The research findings on the perceptions of children regarding hands-on activities indicate that 87.67% of the responses suggest that actively participating in hands-on activities has an impact on their attitudes toward science classes. The study observed that teachers in childhood education offer children opportunities to engage in science lessons through practical hands-on experiences both inside the science lab and in regular classrooms. To illustrate this point here are quotes, from the children themselves;

Yes, I find the science laboratory to be an enjoyable learning environment. Our teacher encourages hands-on activities, and we regularly engage in practical experiments in the science activity room.

We participate in hands-on activities in both the science laboratory and the classroom as they serve to cultivate a scientific mindset within us.

I appreciate engaging in practical activities at home since my parents actively encourage me to explore various scientific experiments.

The sight of the science activity room on the ground floor brings me joy, and I always look forward to spending a significant amount of time there.

The excerpts above emphasize the importance of hands-on activities in shaping attitudes toward science education. This is because hands-on activities allow young children to learn through participating and using their problem-solving skills. According to Martin (2020), hands-on learning is an approach where children develop their understanding by engaging with the content rather than just passively listening to a teacher.

Moreover, it is evident from the children's responses that science laboratory classes are prioritized by childhood educators as a means for teaching science through activities.

Additionally, parents' positive attitudes toward incorporating hands-on activities at home have an influence on children's involvement in scientific endeavors. This shows that parents recognize the value of integrating science with language and mathematics education, which helps attitudes toward scientific learning from an early age.

These findings align with research that highlights the importance of grounding children's learning in hands-on activities (Martin, 2020; Moyses, 2012). Hands-on activities have value as they help connect knowledge with new learning experiences. Furthermore, the availability of databases containing to implement hands-on activities provides a range of options suitable for various early childhood settings.

In general, these findings support the idea of constructivist learning, which suggests that children develop knowledge through hands-on activities. They find value in the process of constructing their understanding (Moyes, 2012). It's important to note that Al Furaikh *et al.* (2017) highlight the significance of activities in teaching science. These activities provide real-life experiences and create an environment where meaningful learning can take place during the grades. Specifically, children are more likely to improve their skills when they are engaged and when those skills have relevance to them. Hands-on learning aims to fulfill both of these characteristics for learning.

### *Third, encouraging children to apply scientific process skills in real-life situations*

Participants highlighted the significance of childhood education teachers in developing young children's abilities to apply science skills in practical, real-life situations. They emphasized that these teachers go beyond theoretical instruction by incorporating hands-on activities and experiments that allow children to explore and apply scientific principles in meaningful ways. By relating scientific concepts to everyday experiences, childhood education teachers help children recognize the relevance and applicability of science in their lives.

The feedback from than 90% of the participants reveals that young kids find science classes valuable because they show them how scientific knowledge can be applied in real-life situations. Here are a few quotes from the children;

Certainly, the study of science is essential as it enables us to comprehend and navigate various aspects of life. Specifically, science has provided me insights into the methods my mother employs to care for plants in our home garden.

Through our science classes, we have recently devised a plan to efficiently utilize water in our daily lives.

I actively incorporate scientific concepts into my daily activities, and these applications contribute to my personal growth. I have gained knowledge about hygiene practices and how to care for my body to shield it from diseases and pollutants.

Moreover, the data analysis indicated that the participants displayed an outlook on science classes due to their teachers' effective incorporation of science into their lives. The remarkable teaching skills demonstrated by childhood educators in the grades significantly contribute to fostering positive attitudes toward early encounters with science. This discovery serves as evidence that children's perception and comprehension of science as well as their perception of scientists' work are influenced by how scientific knowledge is imparted to them both within and beyond the realm of science education (Thomson *et al.*, 2019).

All study participants corroborated this finding, underscoring their comprehension of how to apply scientific knowledge in their everyday routines and when confronted with problems that necessitate the application of scientific principles. This understanding can be attributed to teachers' classroom practices, where they emphasize that early childhood education should focus on applying knowledge and life skills related to science. This

approach aligns with Bloom's Classification of Learning Outcomes (Sisson and George, 2019), as teachers prioritize learning goals based on comprehension, application of knowledge and the development of thinking skills. Moreover, this discovery supports the perspective on learning, which underscores the significance of giving children opportunities to apply and utilize their ideas within social contexts (Jordan *et al.*, 2019; Ormrod, 2019; Ryder, 2009).

#### *Fourth, empowering young children to acquire scientific knowledge independently*

According to the participants, childhood education teachers play a vital contribution in helping young children acquire scientific knowledge. They observed that these teachers effectively introduce scientific concepts, theories and facts in a manner that is accessible and engaging for young learners. By employing age-appropriate instructional strategies, such as storytelling, interactive discussions and visual aids, childhood education teachers create an environment that stimulates children's curiosity and promotes their understanding of scientific concepts.

In the round of interviews, we asked the kids about their interest, in science. Interestingly, every single one of them emphasized how important learning science is to them. It's worth noting that a large majority (100%) responded positively when asked about this topic stressing how science education helps them understand things and events in their surroundings. The children gave responses that highlighted the significance of science education. Here are a few examples of what they said:

Certainly, my interest lies in science classes, as they are essential for gaining insights into our environment.

... Science classes have afforded me the opportunity to acquire knowledge about diverse facets of plants.

Science lessons have provided me with valuable insights into aspects of my health.

Certainly, science education holds great significance for me as my teacher imparts diverse insights about seasonal changes.

The quotes mentioned above show that the kids have a view of the importance of science education. They see science as a subject that gives them knowledge, about life. This finding agrees with what Millar and Osborne (1998) believe that science education in schooling is like a resource for children. Al Furaikh *et al.* (2017) also argue that having literacy at an age is crucial for kids to understand science, appreciate the work of scientists and comprehend the world around them (Thomson *et al.*, 2019).

### **Conclusions and recommendations**

As mentioned earlier this study concludes that children have an outlook on science education. This aligns with the perspective that emphasizes the importance of cultivating attitudes toward teaching science. Science educators and decision-makers should prioritize this aspect (Damianus *et al.*, 2023; Haber, 2020; Madina, 2024). The reason behind this attitude can be attributed to the fact that children in schools are typically exposed to science through traditional teaching methods, such as lectures. Consequently, while young children recognize the significance of science in their lives, they do not find science classes enjoyable. Additionally, children tend to prefer learning from science textbooks by memorizing information.

However, this study identifies factors that influence the development of attitudes toward science teaching in young children.

First, the way in which science is taught has a significant impact on children's attitudes. This aligns with the findings of [Barmby et al. \(2008\)](#) who emphasize the contribution of teaching methods in shaping children's attitudes toward science. [Sshana and Abulibdeh \(2020\)](#) discovered that learners taught through group laboratory approaches display positive attitudes toward science compared to those taught through large lecture demonstrations.

Hence, this study highlights the significance of childhood educators incorporating hands-on activities in the classroom and minimizing lecturing. They should also encourage the application of knowledge in everyday activities. Overall, it is crucial to create a classroom environment that capitalizes on students' interests, curiosity and self-confidence as these factors greatly impact student motivation.

Additionally, teachers' classroom performance has an influence on fostering attitudes toward science. The study reveals that teachers' teaching practices play a contribution in shaping children's attitudes. Teachers specializing in childhood education possess the qualifications to effectively teach young children and promote positive attitudes toward science learning. Furthermore, teachers and parents who hold views about science learning can have an influence on children's attitudes since children often imitate their significant adults' attitudes. Conversely, teachers with perceptions about science may inadvertently pass on these attitudes to children.

Therefore it is advisable for teachers to maintain an approach toward teaching science with the main objective of helping students maximize their learning potential. Additionally, teachers should possess the skills and adopt positive attitudes toward teaching in order to foster positive attitudes among children. According to educationalists ([Damianus et al., 2023](#); [Madina, 2024](#)), students' perceptions of science are influenced by the behavior of their teachers and the classroom environment they create. Therefore, it is recommended that classroom activities prioritize learning to encourage interaction among students.

Furthermore, there exists a correlation between children's attitudes toward science and their parents' perspectives on science education during the grades. Positive attitudes held by parents toward science can be passed on to their children. To reinforce this aspect, teachers should establish channels of communication with parents through sharing journals that underscore the importance of teaching and learning science in the stages of education.

Based on this study's findings, it is strongly recommended that further research be conducted on science instruction and learning in the grades (ages 4 to 6). This area of research is presently overlooked in UAE schools and warrants attention.

Further investigation should also delve into the viewpoints of parents of children regarding the teaching and learning of science in education. Additionally, it would be valuable to examine the approaches employed by teachers in science classrooms.

## References

- AbunForonda, D.S.L.G., Agoot, F., Luisita, M. and Magallanes, T. (2018), "Measuring entrepreneurial attitude and entrepreneurial intention of ABM grade XII, senior high school students of divine word colleges in region I, Philippines", *International Journal of Applied and Fundamental Research*, Vol. 4 No. 4, pp. 100-114.
- Abun, D., Magallanes, T., Encarnacion, M., Ranay, F., Tacmo, C. and Bello, B. (2021), "Attitude toward business and business intention of ABM and STEM students of senior high school of divine word college in ilocos region, Philippines: the role of education", *Technium Journal of Social Science*, Vol. 20, pp. 191-211.
- Ajzen, I. and Fishbein, M. (2015), *The Influence of Attitude on Behavior*, University of Pennsylvania, Annenberg School for Communication, Routledge.

- Al Furaikh, S., Al Omairi, B. and Ganapathy, T. (2017), "A cross-sectional survey on nursing students' attitude towards research", *Journal of Health Specialties*, Vol. 5 No. 4, pp. 185-191, doi: [10.4103/jhs.jhs\\_36\\_17](https://doi.org/10.4103/jhs.jhs_36_17).
- Al-Barakat, A., AlAli, R. and Al-Hassan, O. (2022), "Supervisory performance of cooperative teachers in improving the professional preparation of student teachers", *International Journal of Learning, Teaching and Educational Research*, Vol. 21 No. 8, pp. 425-445, doi: [10.26803/ijlter.21.8.24](https://doi.org/10.26803/ijlter.21.8.24).
- Al-Barakat, A., Al-Hassan, O., Alali, R., Al-Hassan, M. and Al sharief, R. (2023), "Role of female teachers of childhood education in directing children towards effective use of smart devices", *Education and Information Technologies*, Vol. 28 No. 6, pp. 7065-7087, doi: [10.1007/s10639-022-11481-y](https://doi.org/10.1007/s10639-022-11481-y).
- Al-Hassan, O., Al-Hassan, M., Almakanin, H., Al-Rousan, A. and Al-Barakat, A. (2023), "Inclusion of children with disabilities in primary schools and kindergartens in Jordan", *Education*, pp. 3-13, doi: [10.1080/03004279.2022.2133547](https://doi.org/10.1080/03004279.2022.2133547).
- AlAli, R. and Al-Barakat, A. (2023a), "Instructional illustrations in children's learning between normative and realism: an evaluation study", *PLoS ONE*, Vol. 18 No. 9, e0291532, doi: [10.1371/journal.pone.0291532](https://doi.org/10.1371/journal.pone.0291532).
- AlAli, R. and Al-Barakat, A. (2023b), "Requirements to activate children's Islamic education concepts learning in childhood education classes", *Przestrzen Spoteczna (Social Space)*, Vol. 23 No. 03, pp. 207-244.
- Alali, R. and Al-Barakat, A. (2023c), "Role of teacher understanding about instructional visual aids in developing national and international student learning experiences", *Journal of International Students*, Vol. 13 No. 4, pp. 331-354.
- Albarracín, D., Johnson, B.T. and Zanna, M. (2005), *The Handbook of Attitudes*, Lawrence Erlbaum, Mahwah, NJ, pp. 223-271.
- Anderhag, P., Wickman, P., Bergqvist, K., Jakobson, B., Hamza, K.M. and Säljö, R. (2016), "Why do secondary school students lose their interest in science? Or does it never emerge? A possible and overlooked explanation", *Science Education*, Vol. 100 No. 5, pp. 791-813, doi: [10.1002/sc.21231](https://doi.org/10.1002/sc.21231).
- Bakker, A. and Telli, S. (2023), "Primary school students' scientist perception and their attitudes towards science: a case study", *International Journal of Research in Education and Science (IJRES)*, Vol. 9 No. 2, pp. 473-511, doi: [10.46328/ijres.3087](https://doi.org/10.46328/ijres.3087).
- Banaji, M. and Heiphetz, L. (2010), "Attitudes", in Fiske, S.T., Gilbert, D.T. and Lindzey, G. (Eds), *Handbook of Social Psychology*, John Wiley & Sons, Hoboken, NJ, Vol. 1, pp. 353-393, doi: [10.1002/9780470561119.socpsy001010](https://doi.org/10.1002/9780470561119.socpsy001010).
- Bani Irshid, M., Khasawneh, A. and Al-Barakat, A. (2023), "The effect of conceptual understanding principles-based training program on enhancement of pedagogical knowledge of mathematics teachers", *Eurasia Journal of Mathematics, Science and Technology Education*, Vol. 19 No. 6, em2277, doi: [10.29333/ejmste/13215](https://doi.org/10.29333/ejmste/13215).
- Barmby, P., Kind, P.M. and Jones, K. (2008), "Examining changing attitudes in secondary school science", *International Journal of Science Education*, Vol. 30 No. 8, pp. 1075-1093.
- Bell, J. (2014), *Doing Your Research Project*, McGraw-Hill Education, Berkshire.
- Bell, E., Bryman, A. and Harley, B. (2022), *Business Research Methods*, Oxford University Press.
- Bergen, E., Zuijen, T., Bishop, D. and Jong, P.F. (2016), "Why are home literacy environment and children's reading skills associated? What parental skills reveal", *Reading Research Quarterly*, Vol. 52 No. 2, pp. 147-160, doi: [10.1002/rrq.160](https://doi.org/10.1002/rrq.160).
- Buckingham, J., Wheldall, K. and Beaman-Wheldall, R. (2013), "Why poor children are more likely to become poor readers: the school years", *Australian Journal of Education*, Vol. 57 No. 3, pp. 190-213, doi: [10.1177/0004944113495500](https://doi.org/10.1177/0004944113495500).

- Chetty, R., Friedman, J.N., Hilger, N., Saez, E., Schanzenbach, D.W. and Yagan, D. (2011), "How does your kindergarten classroom affect your earnings? Evidence from Project STAR", *The Quarterly Journal of Economics*, Vol. 126 No. 4, pp. 1593-1660, doi: [10.1093/qje/qjr041](https://doi.org/10.1093/qje/qjr041).
- Collins, S. and Osborne, J. (2000), "Pupils' and parents' views of the school science curriculum", *School Science Review*, Vol. 82 No. 298, pp. 23-32.
- Damianus, A., Gerson, J., Christine Alipio, D. and Leonilo, R. (2023), "The effect of students' attitude toward research on the intention to conduct research", *Divine Word International Journal of Management and Humanities*, Vol. 2 No. 2, pp. 268-287, doi: [10.62025/dwijmh.v2i2.26](https://doi.org/10.62025/dwijmh.v2i2.26).
- Díez-Palomar, J., García-Carrión, R., Hargreaves, L. and Vieites, M. (2020), "Transforming students' attitudes towards learning through the use of successful educational actions", *PLoS One*, Vol. 15 No. 10, e0240292, doi: [10.1371/journal.pone.0240292](https://doi.org/10.1371/journal.pone.0240292).
- Drymiotou, I., Constantinou, C.P. and Avraamidou, L. (2021), "Enhancing students' interest in science and understandings of STEM careers: the role of career-based scenarios", *International Journal of Science Education*, Vol. 43 No. 5, pp. 717-736, doi: [10.1080/09500693.2021.1880664](https://doi.org/10.1080/09500693.2021.1880664).
- Emvalotis, A. and Koutsianou, A. (2018), "Greek primary school students' images of scientists and their work: has anything changed?", *Research in Science and Technological Education*, Vol. 36 No. 1, pp. 69-85, doi: [10.1080/02635143.2017.1366899](https://doi.org/10.1080/02635143.2017.1366899).
- Fraihat, M., Khasawneh, A. and Al-Barakat, A. (2022), "The effect of situated learning environment in enhancing mathematical reasoning and proof among tenth grade students", *Eurasia Journal of Mathematics, Science and Technology Education*, Vol. 18 No. 6, em2120, doi: [10.29333/ejmste/12088](https://doi.org/10.29333/ejmste/12088).
- Frenzel, A., Daniels, L. and Burić, I. (2021), "Teacher emotions in the classroom and their implications for students", *Educational Psychologist*, Vol. 56 No. 4, pp. 250-264, doi: [10.1080/00461520.2021.1985501](https://doi.org/10.1080/00461520.2021.1985501).
- Fuqin, W. and Yiwen, S. (2014), "Family background, educational expectation and college degree attainment: an empirical study based on Shanghai survey", *Society: Chinese Journal of Sociology/Shehui*, Vol. 34 No. 1, p. 175, available at: <https://short-link.me/Grel>
- Haber, J. (2020), "It's time to get serious about teaching critical thinking", available at: <https://www.insidehighered.com/views/2020/03/02/teaching-students-think-critically-opinion> (accessed 29 October 2020).
- Javed, S., Wenlan, Z., Ghaffari, A.S. and Buttah, T.M. (2020), "The mediating contribution of technology between students' attitudes and engagement towards science: a quantitative study of students' perception", *International Transaction Journal of Engineering, Management and Applied Sciences and Technologies*, Vol. 11 No. 3, pp. 1-10.
- Jordan, A., Carlile, O. and Stack, A. (2019), *Approaches to Learning: A Guide for Teachers*, McGraw-Hill, Open University Press, Berkshire.
- Kerr, K. and Murphy, C. (2012), "Children's attitudes to primary science", in Fraser, B.J., Tobin, K. and McRobbie, C.J. (Eds), *Second International Handbook of Science Education*, Springer Netherland, Dordrecht, pp. 627-649.
- Khasawneh, A., Al-Barakat, A. and Almahmoud, S. (2022), "The Effect of error analysis-based learning on proportional reasoning ability of seventh-grade students", *Frontiers in Education*, Vol. 7, 899288, doi: [10.3389/educ.2022.899288](https://doi.org/10.3389/educ.2022.899288), available at: <https://d.arj/10.3389/fadak.2022.8992>
- Khasawneh, A., Al-Barakat, A. and Almahmoud, S. (2023), "The impact of mathematics learning environment supported by error-analysis activities on classroom interaction", *Eurasia Journal of Mathematics, Science and Technology Education*, Vol. 19 No. 2, em2227, doi: [10.29333/ejmste/12951](https://doi.org/10.29333/ejmste/12951).
- Li, Z. and Qiu, Z. (2018), "How does family background affect children's educational achievement? Evidence from Contemporary China", *The Journal of Chinese Sociology*, Vol. 5 No. 1, p. 13, doi: [10.1186/s40711-018-0083-8](https://doi.org/10.1186/s40711-018-0083-8).

- Madina, N. (2024), "Factors influencing students' attitude towards science subjects in secondary schools: a case study of secondary schools in Kisseka sub county, Masaka district", *IAA Journal of Education*, Vol. 10 No. 2, pp. 13-26, doi: [10.59298/iaaje/2024/102.1326.11](https://doi.org/10.59298/iaaje/2024/102.1326.11).
- Makhmasi, S., Zaki, R., Barada, H. and Al-Hammadi, Y. (2012), "Students' interest in STEM education: a survey from the UAE", doi:[10.1109/educon.2012.6201144](https://doi.org/10.1109/educon.2012.6201144).
- Mao, P., Cai, Z., He, J., Chen, X. and Fan, X. (2021), "The Relationship between attitude toward science and academic achievement in science: a three-level meta-analysis", *Frontiers Psychology*, Vol. 12, 784068, doi: [10.3389/fpsyg.2021.784068](https://doi.org/10.3389/fpsyg.2021.784068).
- Martin, L. (2020), "The importance of hands-on learning in child education", available at: <https://blog.friendscentral.org/benefits-of-hands-on-learning> (accessed 25 October 2020).
- Mcdonald, C.Y. (2016), "STEM education: a review of the contribution of the disciplines of science, technology, engineering and mathematics", *Science Education International*, Vol. 27 No. 4, pp. 530-569.
- Millar, R. and Osborne, J. (Eds) (1998), *Beyond 2000: Science Education for the Future*, King's College, London, London.
- Ministry of Education (2015), *Science, Technology and Innovation Policy in the United Arab Emirates*, Ministry of Education, Abu-Dhabi.
- Ministry of Education (2024a), *Developing Science and Technology through Education*, Ministry of Education, Abu-Dhabi.
- Ministry of Education (2024b), *Preparing Students for the Future: A Guide to STEM Education in the UAE*, Ministry of Education, Abu-Dhabi.
- Moyses, H. (2012), "Hands-on learning for young children", available at: <https://blog.friendscentral.org/benefits-of-hands-on-learning> (accessed 29 October 2020).
- Ormrod, J.E. (2019), *Human Learning*, Prentice Hall, New Jersey.
- Osborne, J., Simon, S. and Collins, S. (2010), "Attitudes towards science: a review of the literature and its implications", *International Journal of Science Education*, Vol. 25 No. 9, pp. 1049-1079, doi: [10.1080/0950069032000032199](https://doi.org/10.1080/0950069032000032199).
- Potvin, P. and Hasni, A. (2014), "Analysis of the decline in interest towards school science and technology from grades 5 through 11", *Journal of Science Education and Technology*, Vol. 23 No. 6, pp. 784-802, doi: [10.1007/s10956-014-9512-x](https://doi.org/10.1007/s10956-014-9512-x).
- Ryder, M. (2009), Instructional design models, available at: [http://carbon.cudenver.edu/~mryder/itc\\_data/idmodels.html](http://carbon.cudenver.edu/~mryder/itc_data/idmodels.html) (accessed 30 November 2019).
- Shaer, S., Zakzak, L. and Shibl, E. (2019), *The STEAM Dilemma: The Advancing Sciences in UAE Schools – the Case of Dubai*, Mohammed Bin Rashid School of Government, Dubai.
- Sharjah Private Education Authority (2024), *Science Curriculum in the Primary (Grades 1-5)*, Sharjah Private Education Authority, Sharjah.
- Simon, S. and Connolly, J. (2020), "What do science teachers value? How can values change during professional learning?", *Values in Science Education: The Shifting Sands*, pp. 121-137.
- Sisson, P. and George, T. (2019), "Bloom's taxonomy of educational objectives: a template for primary school KM education", *20th European Conference on Knowledge management*, Universidad European de Lisboa, Lisbon, Portugal, September 2019.
- Soomro, T. (2019), "STEM education: united emirates perspective", *Conference: The 2019 8th International Conference*. doi: [10.1145/3318396.3318414](https://doi.org/10.1145/3318396.3318414).
- Sshana, Z.J. and Abulibdeh, E.S. (2020), "Science practical work and its impact on students' science achievement", *Journal of Technology and Science Education*, Vol. 10 No. 2, pp. 199-215, doi: [10.3926/jotse.888](https://doi.org/10.3926/jotse.888).

- 
- The Economist Intelligence Unit (2014), "UAE economic vision: women in science, technology and engineering", *A Report from the Economist Intelligence Unit Limited*, available at: <https://www.eiuperspectives.economist.com>
- Thomson, M.M., Zakaria, Z. and Radut-Taciu, R. (2019), "Perceptions of scientists and stereotypes through the eyes of young school children", *Education Research International*, Vol. 2019 No. 1, 6324704.
- Tytler, R., Osborne, J.F., Williams, G., Tytler, K., Clark, J.C. and Tomei, A. (2008), "Opening up pathways: engagement in STEM across the primary-secondary school transition", A review of the literature concerning supports and barriers to Science, Technology, Engineering and Mathematics engagement at Primary Secondary transition, available at: [https://deakinSTEMe.org/wp-content/uploads/2014/02/STEM\\_Opening-up-Pathways-July\\_08.pdf](https://deakinSTEMe.org/wp-content/uploads/2014/02/STEM_Opening-up-Pathways-July_08.pdf) (accessed 25 October 2020).
- Van der Vleuten, M., Steinmetz, S. and van de Werfhorst, H. (2018), "Gender norms and STEM: the importance of friends for stopping leakage from the STEM pipeline", *Educational Research and Evaluation*, Vol. 24 Nos 6-7, pp. 417-436, doi: [10.1080/13803611.2019.1589525](https://doi.org/10.1080/13803611.2019.1589525).
- Van Griethuijsen, R.A., van Eijck, M.W., Haste, H., Den Brok, P.J., Skinner, N.C., Mansour, N., Savran Gencer, A. and Boujaoude, S. (2015), "Global patterns in students' views of science and interest in science", *Research in Science Education*, Vol. 45 No. 4, pp. 581-603, doi: [10.1007/s11165-014-9438-6](https://doi.org/10.1007/s11165-014-9438-6).
- Vel Žabik, K., Tanaś, Ł., Iłowiecka-Tańska, I. and Karwowski, M. (2021), "Children's implicit theories of creativity in science", *Thinking Skills and Creativity*, Vol. 41, 100898, doi: [10.1016/j.tsc.2021.100898](https://doi.org/10.1016/j.tsc.2021.100898).
- Zubair, A.S. and Nasir, M. (2011), "Developing a scale to measure attitude towards science learning among school students", *Bulletin of Education and Research*, Vol. 33 No. 1, pp. 71-81.

**Corresponding author**

Rommel AlAli can be contacted at: [ralali@kfu.edu.sa](mailto:ralali@kfu.edu.sa); Ali Al-Barakat can be contacted at: [aalbarakat@sharjsh.ac.ae](mailto:aalbarakat@sharjsh.ac.ae)