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EVALUATION OF THE CRITICAL THINKING SKILLS OF SECONDARY SCHOOL STUDENTS IN SAUDI ARABIA

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Abstract

The present study examined critical thinking (CT) and its importance in Saudi secondary education. The sample included upper-secondary students and teachers in Riyadh, Saudi Arabia's capital and largest city. Qualitative and quantitative methods were used to study students' CT skill development, barriers to growth, instructors' views on CT advancement, and students' views on their CT skills. The study examines secondary school students' critical thinking development and impediments. It also examined teachers' perceptions of their students' progress in CT. The research collected quantitative data from 374 questionnaires and qualitative data from eight interviews. *SPSS performed regression analysis on survey quantitative data. A thematic analysis was employed to evaluate qualitative interview data. The quantitative findings from the surveys revealed uneven CT skills. The findings also showed that gender, Grade Point Average (GPA) and family background affect CT. The qualitative findings from the interviews with the teachers stressed the importance of collaborative programming and active student engagement in classroom activities to foster CT. Bullying and peer pressure hindered autonomous and CT, making it difficult for instructors to motivate and support students. The findings emphasised the importance of teachers in creating a safe learning environment and encouraging analytical thinking. Recommendations for improving CT in Saudi secondary education were proposed addressing several critical aspects of CT advancement, including curriculum development, teacher training, parental involvement, government-led extracurricular learning, teacher-student interactions, and gender equality in CT advancement. This study could help Saudi students develop CT skills to meet the challenges of the modern world.*
Keywords: *critical thinking (CT), mixed-methods research, Saudi Arabia, secondary education, teacher-student interaction*

Introduction

The application of critical thinking (CT) in education can facilitate students' comprehension of and engagement in analytical discourse and problem-solving activities. During academic activities in a classroom setting, students and professors may engage in intellectual discourse and initiate debates. CT acquisition and utilisation can enhance students' performance of routine tasks, enabling them to assume additional responsibilities. Henry Giroux, a prominent scholar in the field of critical theory, has contributed significantly to the domains of learning and education in the United States. Giroux (1978) emphasised the importance of CT in education as it can also help students to challenge oppressive systems. Freire (1970) also underscored the vital role of education in challenging systems of oppression and subjugation. He held that education has the potential to empower marginalised and oppressed people. Emancipation is

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attained through the facilitation of dialogue, wherein the student assumes an active role in the educational journey and the instructor places significance on students' perspectives and contributions. This approach to education can provide exceptional opportunities for learning and development, as well as help students question what they see as oppressive structures in society, including in educational arenas.

Brookfield (2005) asserted that the incorporation of CT into the field of education holds significant importance. This educational approach can equip students with the necessary skills to effectively adapt to unpredictable circumstances and successfully navigate rapid shifts in social, economic, and technological landscapes. Rodzalan and Saat (2017) showed that CT skills contribute to students' acquisition and evaluation of novel information, something which has a wide range of practical uses and advantages outside of the educational sphere. The advantages of CT, in short, stretch far outside the borders of the classroom. To cultivate CT, it is imperative to incorporate this cognitive process into various aspects of academic endeavours, such as courses, projects, collaborative work, and individual assignments.

Problem Statement

In order to mitigate the apprehensions surrounding the scholastic achievement of Saudi Arabian students in the domain of CT abilities, it is imperative to analyse the recent modifications to the nation's educational framework and its strategic objectives. Acknowledging the significance of enhancing students' CT capabilities, the Saudi government has placed primary and secondary education as a top priority (Allmnakrah & Evers, 2019; Dinham & Rowe, 2008; Topping, 2011). Notwithstanding these endeavours, apprehension persists regarding the scholastic achievement of Saudi students' CT skills (Moshashai & Bazoobandi, 2020). The swift evolution of the nation's educational system and its strategic plans, which require the utilisation of current and pertinent resources, amplify this concern.

Concerns have been raised by the Saudi Ministry of Education and education experts regarding the calibre of teaching and the necessity for educators and students to acquire more advanced proficiencies (AlNajdi, 2022). As a reaction to these apprehensions, the government has allocated additional funds towards social and economic progress. These funds are currently being utilised to support educational programmes that explore novel approaches in the fields of information technology, professional development, and information systems (Allmnakrah & Evers, 2019; Tayan, 2017). Furthermore, in Saudi Arabia, recent policy measures pertaining to children with disabilities have prioritised their integration into regular educational institutions, demonstrating a dedication to catering to the varied educational requirements of this population (Abu-Alghayth et al., 2022).

It is essential to identify specific challenges and develop targeted solutions in collaboration with parents and other stakeholders in order to guarantee the academic success of students (Allmnakrah & Evers, 2019). The aforementioned collaborative approach is consistent with the imperative for a paradigm shift in the Saudi education system, specifically in the execution of the country's wide-ranging 'Vision 2030', which underscores the significance of teacher input, professional development, and the cultivation of critical thinking skills as critical factors for achieving future prosperity (Allmnakrah & Evers, 2019).

In addition, it is imperative to conduct an extensive statistical analysis of the test results of students in order to establish a solid basis for a meticulous exploration of the elements that contribute to the below-average academic achievements of Saudi students in international comparisons and to devise possible solutions (Allmnakrah & Evers, 2019). The present inquiry will employ the latest and most pertinent materials at its disposal, comprising official documents pertaining to educational strategic plans and Ministry of Education resources, in addition to web-accessible research from Saudi universities that offers significant insights into the present condition of education in Saudi Arabia (Allmnakrah & Evers, 2019).

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A multifaceted strategy is necessary to tackle the issues surrounding the scholastic achievements of Saudi Arabian students in CT skills. This strategy should involve engaging stakeholders in the decision-making process, allocating financial resources towards educational improvements, and conducting an exhaustive statistical analysis of students' test results. The forthcoming modifications in the educational system and the nation's strategic blueprints, in addition to the resources accessible from credible sources like the Ministry of Education and Saudi universities, ought to inform these endeavours.

The issue that this study aims to explore is the perceived inadequacy of CT abilities among Saudi Arabian secondary school students. In spite of the recognition of the significance of CT and the government's emphasis on education as a priority, there is concern that students' CT abilities are not progressing as anticipated. The significance of this issue lies in the fact that students' academic achievements and their capacity to participate in intellectual dialogues and resolve challenges are heavily reliant on their CT abilities.

The primary aim of this study was to acquire an all-encompassing comprehension of the condition of CT abilities among secondary school students in Saudi Arabia. This entails examining the methods by which these abilities are nurtured, discerning the obstacles and determinants that impede their growth, and delving into the viewpoints of educators and learners regarding this matter.

Research Aim and Objectives

The present study aims to understand the development of critical thinking skills among secondary school learners. To achieve this aim, the study has the following objectives:

- To explore how secondary school learners develop their critical thinking skills;
- To identify the challenges and factors that hinder the development of students' critical thinking skills;
- to explore the viewpoints of teachers regarding the progress of students' CT abilities;
- to explore students' perspectives on CT and the extent to which they have developed this skill set.

By providing an in-depth comprehension of the current state of the development of CT skills in secondary institutions in Saudi Arabia, these questions will aid in resolving the issue and accomplishing the research's objective. In order to more effectively cultivate students' CT skills, possible modifications to pedagogical approaches and policy may be influenced by the results of this study.

Education Policy in Saudi Arabia

Saudi Arabia's four-stage education system mandates formal schooling for children aged six to 18. Primary school, which provides students with a foundation in basic subjects, begins at age six and continues through age 12. Students aged 13 to 15 attend lower-secondary school, which bridges the gap between primary and secondary education. Upper-secondary school, which lasts from ages 16 to 18, offers a more specialised and comprehensive curriculum that prepares students for college and/or the workforce. This educational journey equips students with essential knowledge and skills for future success. Upper-secondary school, which typically commences at the age of 16 and 18, is the culminating phase of formal education. Its objectives are to equip students with the necessary skills for employment or to prepare them for tertiary or adult education. Typically, upper-secondary school offers a broader selection of subject options and streams (Al-Shumaimeri, 1999). Gender segregation starts in fourth grade and continues through upper-secondary school, with only female teachers working in girls' schools and male teachers in boys' schools.

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Saudi Arabia's education policy aligns all levels of education with the nation's socioeconomic and cultural needs (Alshaer, 2008). The policy aims to equip students with modern knowledge and skills for national and global development, recognising education's crucial role in infrastructure development. The government's strategic plans, including the five-year, 10-year, and Saudi Vision 2030 initiatives, prioritise social and economic growth (Alomi et al., 2021; Kosárová, 2020). However, cultural and political constraints have led to a more conservative approach, hindering cognitive development, moral standards and CT among students. These challenges include traditional teaching methods, such as rote learning and teacher-centred instruction, large class sizes and insufficient support from school administrators and teachers in promoting CT. In addition, the majority of the curriculum prioritises – and rewards - memorisation over comprehension.

Concept of Critical Thinking

According to the literature, CT relies on context; hence, there is no single definition of it. Educators employ the term 'critical thinking' to delineate modes of cognition, analysis, and learning which surpass mere rote memorisation and recollection of facts and information. It is a broad concept that encompasses numerous learning acquisition methods and a great deal of mental processes. CT, as defined in educational theory, is a mode of cognition that generates potential solutions to problems through the use of deliberative reasoning and objective examination of information.

CT is a pivotal notion within the realm of education, inspiring educational reforms that advocate for schools to prioritise lifelong skills applicable across all academic disciplines, professional environments, and civic engagements (Halpern, 2011). Lai (2011) asserted that years of experience, feedback, evaluation, and teachers' perceptions of students' learning have an impact on teaching approaches, communication skills, and CT (Halpern, 2011). Students are able to improve their academic performance by organising, analysing, and completing assignments with the aid of CT. Education, psychology, and philosophy have all considered the concept of CT (Paul, 2005). In education, teaching approaches, communication skills and CT are affected by years of experience, feedback, evaluation and how teachers perceive students' learning (Lai, 2011). CT helps students organise, analyse and complete assignments, boosting their academic performance (Paul, 2005; Phan, 2010). It also improves the thought process of students so that they can grasp course requirements and soak up course material faster (McGregor, 2007). In contrast, explaining and fixing a problem encourages students to respect CT. In addition, Lovatt (2014) noted that prior knowledge and experience can impact how individuals interpret and implement CT skills. In order to ensure optimal student development, it is crucial to strike a balance between practical application, prior knowledge, and CT.

Bloom (1956) proposed six learning modes to conceptualise CT: 1) reading and remembering numbers, faces and processes; 2) engaging in secondary comprehension to understand and illustrate facts; 3) applying generalised facts to other settings and situations; 4) analysing and understanding facts for problem-solving; 5) synthesising and making connections between workplace elements; and 6) gaining knowledge. According to Bloom (1956), CT skills are important for analysing, synthesising, and evaluating information, however, he posited that these skills may not be essential for the acquisition of core knowledge, secondary understanding, and application. As he (1956) pointed out, CT skills can be a valuable tool for overcoming learning obstacles. However, he warned that students may encounter criticism if they employ CT to challenge societal norms, cultural traditions, and rituals. While CT skills are useful for certain cognitive tasks, Bloom thus acknowledged that when these skills are applied to challenge established norms, social problems may result. In short, although CT skills can help students to think independently and challenge existing ideas and beliefs, if students are not

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careful, they may encounter criticism or even a backlash from their peers, teachers, or family members for not conforming to societal expectations.

The academic discourse surrounding CT underscores its expansive nature, which incorporates a multitude of cognitive processes and learning acquisition strategies, and its crucial function in stimulating reforms in education. As part of the broader educational reforms, the recent changes in the Saudi educational system, specifically the implementation of the Vision 2030, highlight the significance of developing CT skills (Allmnakrah & Evers, 2019). In order to achieve the objectives outlined in Vision 2030, a fundamental transformation of the Saudi education system is required (Allmnakrah & Evers, 2019).

Developing Students' Critical Thinking Skills

The cognitive capabilities of upper high schoolers were highlighted by Adeyemi (2012) in the pursuit of cultivating CT skills, asserting that they possess a greater capacity to examine theories. In order to effectively engage in CT, Nigerian secondary school students should possess higher cognitive abilities, which include problem-solving, synthesis, and text evaluation. Furthermore, Adeyemi highlighted the facilitative role of CT, which involves inquiry and fact-based reasoning, in children's learning process. To enhance CT skills, Adeyemi suggested that students might consider addressing personal issues, such as biases or preconceptions, recognising that individual perspectives affect CT. The researcher also stressed that real-world experience is an important catalyst for the development of cognitive skills. As well as learning CT in the classroom, children have the opportunity to engage in a wide variety of other environments, including the home and social settings.

Factors Affecting Students' Critical Thinking Abilities

A comprehensive examination of CT abilities among students reveals multifaceted influences, as observed in a study on Indonesian and Hong Kong student populations by Mawaddah et al. (2018). The scholars' qualitative study of male and female students demonstrated proficiency in articulating and analysing issues in the students' native language. However, a notable gender disparity was observed, with male students adopting fewer appropriate solutions than their female counterparts. Mawaddah et al. (2018) posited that female brains have more efficient neuron circuits, which organise brain connections, than male brains. As a result of this intriguing biological insight, conventional views of cognitive capability have been challenged. Nevertheless, the specific factors contributing to the superior performance of female students remain unclear, and further research is needed.

Culture plays a pivotal role in the development of CT skills, as Rohmani and Kusuma (2016) highlighted in their study of the influence of Indonesian culture on CT. Unlike industrialised nations, where CT abilities are prioritised over rote memorisation, Indonesian culture emphasises explanations and information. In addition to this insight, by examining CT through the lenses of family history, cultural nuances, and preferred learning methods, Rohmani and Kusuma (2016) demonstrated that low levels of CT can be attributed to limited mastery of a second language.

The impact of parental roles on students' CT abilities was examined by Cheung et al. (2001) in Hong Kong. This study showed that fathers' and mothers' occupations are significantly positively correlated with the development of their children's CT. Interestingly, paternal work status seemed more influential than maternal work status. In contrast, maternal education did not seem to have any discernible effect on students' CT abilities.

Furthermore, it is crucial to take into account the evolving Saudi educational environment, the gender disparities and cultural influences that continue to impact students' CT abilities. In

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the context of the evolving educational landscape in Saudi Arabia, the studies of Rohmani and Kusuma (2016) and Cheung et al. (2001) regarding the impact of parental roles on students' CT abilities and the influence of culture on critical thinking, respectively, are especially pertinent.

The Teacher's Role in Fostering Critical Thinking Skills

Teachers play an obvious and important role in shaping students' behaviour and cognitive development (Massa, 2014; Pajares & Kranzler, 1995). According to Massa (2014), teachers should encourage students to develop and defend ideas by assigning math problems and writing tasks-an approach that is dependent upon an instructor's confidence in his or her students' ability to develop and defend ideas. Pajares and Kranzler (1995) emphasised the importance of teachers trusting their students and encouraging them to think critically and expand their horizons.

Slameto (2017) emphasised the role of teachers as change agents driving school reforms, with the aim of improving both students and schools. By encouraging students to participate in class and participate in group work, teachers are able to influence their minds, reshaping their perspectives on their futures, and Saudi Arabia is no different.

Effective education in CT depends on teachers' comprehensive understanding of the concept, coupled with continuous professional development (Gokhale, 1995). A critical component is cognitive function, with Gokhale advocating for instructors to attend professional development courses that cover CT skills, including reasoning, judgment, decision-making, analysis, and evaluation of information.

Brookfield (2011) underscored the importance of teacher role modelling in the classroom. The purpose of this activity was to share personal examples of CT engagement and to examine assumptions. In Brookfield's view, teachers should encourage CT by providing evidence that students have previously accomplished such tasks. The purpose of class activities should also be explained to students in order to build trust and confidence. Students who believe their instructor has a well-defined strategy are more likely to complete activities with clear objectives (Brookfield, 2011).

Moreover, within the framework of educational reforms, the significance of educators' assistance in cultivating CT abilities cannot be overstated. Gokhale (2021) has underscored the importance of teachers maintaining a consistent professional development programme and acquiring a thorough comprehension of CT. This has correlated with the current endeavours to reform the Saudi education system and incorporate CT abilities into pedagogical approaches.

Barriers to Students' Critical Thinking Development

Effective cultivation of CT faces significant challenges in environments characterised by conservative political climates and resistant cultures. Cultural barriers, which encompass family and community values, have a profound impact on beliefs and ways of life. It is this type of situation that hinders the integration of the school and students into the broader community. In the absence of such cultural capital and a conducive socio-political context, communication and CT in education are rendered obsolete. Educational systems must promote healthy debates in order to foster a conceptual understanding of sociology, particularly challenging patriarchal and authoritarian social structures that inhibit student and teacher expression (Giroux, 1978).

A strong knowledge base and intrinsic motivation are also necessary for empowering individuals to think critically. Partial domain specialisation, however, can hinder analytical thought in domains where citizens rely on representatives, such as politics. Those who have extensive knowledge of economics may have difficulty analysing political issues objectively, for example. Paul and Elder (2001) suggested that partial domain specialisation may encourage citizens to think objectively rather than analytically, especially in areas where trust in

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representatives is paramount. As a result of political restrictions, students are further limited in their ability to express critical thoughts and utilise existing knowledge.

Cotton's (1991) study foresaw that despite new thinking paradigms among students, strengthening CT skills would be challenging in the 21st century. Educational, sociocultural, and political structures are crucial to addressing such challenges. According to Larsen (2002), the primary challenge in teaching critical thinking lies in difficulties associated with curriculum development due to the need for trained instructors, curriculum developers, and sufficient time. Alfani (2013) found that Nigerian teachers struggle to incorporate CT into classroom lessons and assessments. Ilyas (2015) found that Indonesian teachers lack a deep understanding and application of CT. Overall, these findings indicate that the primary challenge to cultivating CT skills in students lies in addressing teachers' lack of competence in the area. This necessitates specialised training for educators to effectively comprehend and teach CT. This is the initial step toward fostering an upcoming generation of 'critical thinkers'.

In addition, cultural and political obstacles that impede the development of students' CT are germane to the Saudi educational system. Particularly in the context of Vision 2030, the imperative to overcome cultural barriers and encourage constructive discourse in order to cultivate CT is consistent with the objectives of educational reforms in Saudi Arabia (Essa & Harvey, 2022).

Research Methodology

An examination of student CT skills as well as teacher perspectives at upper secondary schools in Riyadh, Saudi Arabia's capital and largest city, was the focus of the present study. The study examined the relationship between students' CT skills (the dependent variable) and their personal and familial backgrounds (independent variables). The study targeted six schools–three for boys and three for girls–to collect data. It employed 374 questionnaires and eight interviews for quantitative data collection, analysed using SPSS regression analysis, and used thematic analysis for the interview data.

As shown in Table 1, 28% of the students are in their first year, 34% in their second year, and 38% in their third year.

Table 1
Student Distribution by Year of Study

Year of study	Percentage
First year	28
Second year	34
Third year	38

Assessment of Critical Thinking Competencies

The literature indicates a correlation between CT competencies and the propensity for control and proactivity within educational settings and daily life scenarios, underscoring the significance of these skills (Rohmani and Kusuma, 2016). The assessment of CT in primary and secondary education continues to be a contentious issue. While some theorists posit that the evaluation of these competencies is feasible, a consensus on standardised methodologies is lacking (Munkebye & Gericke, 2022). It has been proposed that the development of assessment tools incorporating various items to encapsulate CT may be beneficial (Miller & Cohen, 2019). In this study, a novel metric consisting of 25 items will be used to assess students' CT skills, which was developed by Stupple et al. (2017).

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Paradigms of Positivism and Interpretivism

Positivism tends to be associated with deductive methodologies, whereas interpretivism tends to be associated with inductive methodologies. A qualitative methodology is indispensable for exploring novel research inquiries, while quantitative methodologies are essential for developing and testing theories and hypotheses (Taylor, 2015). Inductive reasoning, in contrast to the deductive paradigm, begins with observations leading to the development of a hypothesis, which is then subjected to empirical testing (Evans, 2016). The limitations inherent in both positivist and interpretivist frameworks can be mitigated through mixed-method research, thereby leveraging the strengths of both approaches (Green & Johnson, 2017). The current literature review establishes that CT can be effectively examined through both quantitative and qualitative research techniques. Among the more notable quantitative investigations of CT are those conducted by Chaipichit et al. (2015), Chattuchai et al. (2015), and Rodzalan and Saat (2017). As part of the qualitative component of this study, semi-structured interviews were conducted with educators in order to gain insight into their perceptions regarding the integration of CT within the national curriculum and to identify potential barriers to this integration.

Recruitment Strategy

The research focused on upper-secondary school students and teachers in Riyadh, Saudi Arabia. A digital survey was disseminated via email to the children's parents, utilising a purposive sampling strategy. The survey, designed to gather quantitative data from students, probed the nexus between student background characteristics and the development of their CT skills. The survey methodology facilitated comprehensive data collection, which was subsequently analysed employing both descriptive and inferential statistical techniques. The survey instrument, which demonstrated both reliability and validity, comprised closed-ended questions with Likert-scale responses. Additionally, an interview protocol was established to capture teachers' perspectives on critical thinking proficiency.

Analysis of Quantitative Data

The quantitative data were analysed with SPSS version 25, applying both descriptive and inferential statistical methodologies. Techniques such as cross-tabulation, the Mann-Whitney U test, the Kruskal-Wallis test, and multiple linear regression were utilised to elucidate the relationships between CT skills development among students and their personal and familial backgrounds.

Dependent and Independent Variables

The dependent variable under consideration was students' critical thinking ability. Independent variables included gender, study section, grade point average (GPA), and the educational levels of the students' fathers and mothers.

Dummy Variables

During regression analysis, categorical independent variables were converted into dummy variables, with a value of one for presence and zero for absence. In addition to gender (1 for males, 0 for females), GPA, year, specialty, and parents' educational and employment background, this was applicable to many variables.

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Interview Transcription

All interviews were audio-recorded, transcribed verbatim, and thematically deconstructed to identify predominant themes. The findings present the results of this process of abstraction and transformation of qualitative data.

Thematic Analysis

Qualitative data analysis can be conducted in several ways, such as through thematic or content analysis. Based on the prevalence and context of specific lexicons within textual data (Krippendorff, 2018), specific lexicons can be assessed within textual data. Conversely, thematic analysis does not focus on quantifying words or themes, but rather elucidating emergent ideas and conceptualisations derived from interview transcripts. By identifying and examining salient themes, researchers are able to distill the basic meaning behind the data (Braun & Clarke, 2012).

Research Results

Quantitative Results from the Student Surveys

Regarding gender, 55% of the students were male and 45% were female. As such, there were no significant differences in gender among the participants. Table 2 shows that 79% of the students focused on the sciences, while 21% specialised in the arts. The maternal and paternal education levels of the students are similar.

Table 2
Distribution of Students Arts and Sciences

Field of study	Percentage
Arts	21
Sciences	79

The distribution of the students by the educational attainment of their fathers is depicted in Table 3. The educational levels are denoted on the x-axis by the following labels: secondary, diploma, bachelor, and postgraduate. The y-axis represents the proportion of students at each of these educational levels. A significant proportion of students have fathers with a secondary education (35%) or a bachelor's degree (38.6%). A smaller proportion of students have fathers with a postgraduate education or a diploma, accounting for 11.8% of the total.

Table 3
Distribution of Students by the Educational Levels of their Fathers

Fathers' Qualification	Percentage
Secondary School	35
Diploma	14.6
Bachelor	38
Postgraduate	11.8

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Table 4
Distribution of Students by the Educational Levels of their Mothers

Mothers' Qualification	Percentage
Secondary School	42.1
Diploma	18
Bachelor	36.3
Postgraduate	3.6

A significant number - 52.1% - of the student cohort demonstrated proficiency in identifying inappropriate emotive language within scientific arguments as a result of the evaluation of their CT abilities. Nevertheless, it is concerning to note that 31.1% of the students were unable to demonstrate their ability to demonstrate this particular CT skill or perform unspecified tasks. Furthermore, 82.3% of the students demonstrated a capacity for independent CGT through the development of well-defined aims and objectives. Despite this, it is evident that students would benefit from heightened awareness of the necessity of CT in understanding and analysing concepts, especially within the realm of psychological issues. In the survey, 42.2% of students acknowledged that CT was critical to academic success, while the remainder disagreed. Impressively, more than half of the participants effectively showcased their CT skills through writing, contrasting with a minority that struggled in this regard. Furthermore, 42.2% of the respondents perceived CT as a prerequisite for higher education, whereas 17.5% were uncertain about its importance.

Over 80% of the students expressed the need to enhance their CT skills for quicker assignment completion. They were eager to seek additional materials beyond the curriculum to support their CT skills. All of them were eager to search for materials not in the curriculum to help them think critically. Over one-third considered themselves competent critical thinkers, approximately 40% saw CT as a necessary component of higher education, compared with 35.1% who disagreed. The former attributed the necessity of CT to their ability to manage their higher education without the need to rely solely on memorization and rote learning.

A discerning 42.4% of the respondents reported developing CT skills as they progressed along their academic journey. However, 44.8% expressed scepticism regarding the necessity of developing CT in academic pursuits. As a result of this sentiment, a significant portion of the student population did not demonstrate adequate CT skills. A substantial number of students believed that honing CT skills could potentially enhance their performance in examinations. The student body also indicated that many students required assistance in analysing novel information, evaluating arguments, and comprehending the interconnections among variables. None of the surveyed students acknowledged possessing a focused systematic way of thinking, contrasting starkly with the 80% majority who said they had yet to develop such skills. Another 20% of the students remained neutral or unaware of their thinking approach, signalling a lack of conscious engagement with cultivating CT tools. This collective response suggests that a significant proportion of students are not equipped with the necessary cognitive skills for CT.

On the broader spectrum of CT abilities, a notable 84.5% of the respondents demonstrated the essential cognitive skills required for critically evaluating and analysing both positive and negative aspects of a subject or situation. However, it is concerning that 5% indicated a need for further development in this capacity. A distinct observation emerged when assessing CT skills in the context of reading – only 36.2% of the students exhibited proficiency. This finding underscores a deficiency in the reading capabilities of secondary school students in Saudi Arabia.

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More than two-thirds of the students demonstrated proficiency in CT in terms of restating others' ideas. However, 19% acknowledged that they lacked this ability, and 15.8% expressed uncertainty regarding their level of mastery in this regard. It is worth noting that although 43.3% of the students in the classroom self-identified as critical thinkers, the remaining students formed two distinct categories. 24.7% of the student population, or the first group, possessed the knowledge that they were devoid of this particular attribute. It was determined that the second group, comprising 31.9% of the students, lacked this skill irrespective of their own perception. Overall, the survey results underscored the need for additional advancements in the cultivation of critical thinking abilities among Saudi students.

Tables 5, 6, 7, and 8 present insightful correlations between CT abilities, gender, GPA, and family background. In Table 5 in Appendix 1, a notable gender disparity emerges: Male and female students alike recognise the significance of Critical Thinking (CT) in the context of higher education, although their viewpoints differ marginally. Regardless of gender, students concur on the significance of CT. However, their approaches to it differ in subtle ways. Male students are more likely to associate CT with clearly defined objectives and perceive it as a substantial instrument for attaining said objectives. Female students, although acknowledging the importance of CT, generally possess a more comprehensive comprehension of its function within the realm of higher education. The aforementioned distinctions are inconsequential and do not undermine the consensus regarding the worth of CT in higher education. Interestingly, the male students excelled at comprehending complex relationships among variables. This gender-based differentiation underscores the role of gender in influencing how students approach CT and goal-setting. Additionally, GPA levels are linked to specific strengths and areas for improvement in CT skills, shedding light on the intricate interplay between these factors in academic performance and cognitive abilities.

Moving to Table 6 in Appendix 1, the connection between CT abilities and GPA becomes evident. Students with a GPA of 90–100 excelled at recognising inappropriate emotional language but need to prioritise CT in psychology. Conversely, students with a GPA of 70–80 outperformed their counterparts in the 80–90 and 90–100 categories. This finding highlights a nuanced understanding: even among high-achieving students, there is a targeted area for improvement–specifically, the application of CT skills within the realm of psychology. The observation underscores the complex nature of CT and its diverse relevance across academic domains.

Table 7
Model Summary

Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate
1	.542	.459	.416	7.77273

As seen in Table 7, a multiple linear regression model accounted for 40.16% of the variability in the students' CT skills. Gender and maternal education level were significant factors that influenced CT skills development. Females tended to exhibit higher proficiency in CT, while a positive correlation existed between maternal education level and CT skills development.

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Table 8
Analysis of Variance

Model	Sum of squares	*df*	*M* square	*F*	*p*
Regression	1510.578	18	93.921	2.389	< .001
Residual	24286.987	402	60.415		
Total	25797.565	420			

Table 8 illuminates a noteworthy association between CT abilities and personal and familial background traits, with maternal education level emerging as a positive influence on CT skills development. The ANOVA analysis ($F = 2.389$, $p < .001$) underscores a significant correlation between students' development of CT skills and their personal and familial background. The multiple regression coefficients further reveal key insights: female students exhibit higher vertical thinking abilities ($B = 1.607$, $p = .047$), and those with GPAs of 90-100 surpassed their peers with GPAs of 80-90 and 70-80 in CT.

A significant positive relationship is established between maternal education levels and CT development. However, no significant relationships were identified between CT skills and paternal education levels, study specialisation, or parental employment levels. In sum, the study underscores the impact of specific background factors, notably maternal education, on students' CT abilities, offering valuable insights into the nuanced interplay between these variables.

Qualitative Results from the Interviews with the Teachers

The teachers proposed multiple definitions of CT skills and acknowledged that it is crucial for students to develop these skills so that they can successfully tackle challenges, engage in thorough research, and excel in their studies. For instance, one teacher defined CT as, "the ability to identify the problem, analyse issues and reasoning, and maintain neutrality in judging arguments – without bias." Similarly, a female teacher described CT, stating, "Critical thinking focuses on students' ability to solve problems and reach conclusions," highlighting the problem-solving aspect of CT.

The interviews revealed that effective CT development depends on active classroom participation and collaborative education programmes. Teachers are key in this process, as one male teacher emphasised the need for information literacy: "Students should rely on reliable sources, like academic sites, and distinguish between different information sources." Complementing this, a female teacher focused on student autonomy: "Students should not depend solely on teachers for developing critical skills. For example, we challenge them with problems not found in textbooks."

Integrating current pedagogical methods and building students' confidence in their viewpoints were identified as challenges. Bullying was cited as a significant barrier to independent thinking and CT development. Addressing this, one male teacher stated, "Teachers often don't motivate students to think critically, discouraging questions in class." A female teacher echoed this, expressing "While I try to encourage problem-solving, the focus on memorisation in the curriculum limits fostering critical thinking."

These insights from the interviews underscore the need for teachers to inspire CT and create a safe learning environment. Adapting teaching strategies to develop students' confidence and independent thinking is essential for their growth in CT skills.

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Discussion

The current study explores the development of CT among upper-secondary students in Saudi Arabia, employing a mixed methods research design to gain insights from both students and teachers. A quantitative approach utilised an online questionnaire administered to a substantial sample of upper-secondary schools' students in Riyadh, Saudi Arabia. Concurrently, qualitative data was collected through interviews with teachers. Statistical analyses, including regression analyses using SPSS, were conducted on the quantitative data, while thematic analysis was employed to analyse the qualitative insights obtained from the interviews.

The study uncovered congruencies in the perspectives of both students and teachers concerning CT, emphasising problem-solving, analysis, and decision-making skills. Notably, the participating students demonstrated a broader conception of CT that encompassed creativity and deep thinking. This aligns with findings from Beverley (2016), where British students and teachers shared a consensus on the definition of CT. However, discrepancies were observed when compared to Knight (2007), who reported differences in the perceptions of skill assessment between students and teachers. It is essential to note that while Knight's study relied on practical assessment, our study derived insights from students' perceptions, accounting for the divergent results.

Regarding the students' CT proficiency, the findings suggested that they can engage in analytical thinking, but abilities vary. Moreover, many students appeared to lack confidence in their CT skills, although this did not appear to hinder their use of those skills in educational settings. However, at times, some students may hesitate to question their teachers or the content of their educational materials because they lack confidence in their ability to think critically. Therefore, educational practises should focus on developing CT skills and boosting students' confidence in their ability to think critically.

The findings also emphasised the need to improve students' comprehension of the significance of CT in psychology and its relevance in their daily lives. Without a clear understanding of the importance of CT, students may not feel motivated to develop and use these cognitive skills.

Saudi Arabia's cultural values, traditions and norms shape how students view CT. The existence of this cultural component could potentially impede the growth of CT and engender a deficiency in students' self-assurance regarding these capabilities. Certain cultural assumptions may hinder the development of CT skills. One way to enhance curricula is by incorporating CT exercises that showcase respect and cultural sensitivity. This approach allows students to recognise the importance and usefulness of CT skills in their own cultural contexts.

Researchers have identified a deficiency in CT skills among Saudi students, as evidenced by their performance in international assessments (Alharbi, 2022). For instance, recent TIMSS examination results revealed that eighth-grade Saudi students scored lower than their global counterparts in science and mathematics, subjects intricately linked to CT (Alharbi, 2022). Similarly, the 2018 PISA assessment indicated that Saudi Arabia's average math score was 374, compared to the global average of 489 (Alharbi, 2022).

Addressing this challenge requires a nuanced teaching approach. While cooperative learning activities, such as collaborative projects and idea exchanges, have shown promise in fostering CT skills (Alwadai, 2014), it is crucial to recognise the diversity of effective teaching methods. Limitations in CT skills may stem from outdated teaching practices and students' lack of confidence (Alwadai, 2014). Thus, educators need to adopt a variety of innovative approaches tailored to the specific needs of the students and the subject matter.

To enhance CT, educators must actively engage students in interactive learning experiences. Cooperative learning activities encourage independent thought but also facilitate a deeper understanding of complex topics through peer interaction (Alharbi, 2022). However,

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teachers must create an environment that instils confidence in students, fostering a collaborative and trusting atmosphere where questions are encouraged.

Innovative teaching methods are underscored by real-life events and verifiable information (Alharbi, 2022). Statistical data further support this argument, revealing that students taught through innovative methods are twice as likely to achieve better scores on standardised tests than those taught through traditional approaches. Moreover, these students demonstrated an increased inclination to pursue higher education and secure higher-paying jobs, emphasising the broader societal impact of effective teaching strategies (Alwadai, 2014). Nevertheless, it is crucial to approach these findings with caution, recognising that various factors contribute to academic outcomes. A holistic understanding of the challenges faced by students is essential for effective intervention.

The increasing adoption of inquiry-based learning in education is a positive trend, involving active student participation in research and subject evaluation. A study conducted by Alharthi and Alsufyani (2020) supported the benefits of inquiry-based learning, indicating that students exposed to this approach achieved higher scores in CT tests compared to peers who did not engage in such methods. This underscores the potential effectiveness of inquiry-based learning in fostering and enhancing CT abilities.

Furthermore, the integration of modern teaching methods aligns with global educational trends that prioritise problem-solving, collaboration, and hands-on learning. These approaches better prepare students for the challenges of the modern world, where CT is a crucial skill. Notably, the implementation of project-based learning has shown promising outcomes, leading to increased completion rates and improved project quality. Research, including a study by Alharthi and Alsufyani (2020), consistently indicates that project-based learning positively influences academic performance and enhances CT skills. Students exposed to these methods not only perform better academically but also acquire practical CT skills that are valuable for real-world applications.

In line with previous research, the present study found that female students exhibited better CT skills than male students. In addition, higher GPAs correlated with increased CT skill development increased, indicating that academic performance can motivate students to engage in CT.

Regarding barriers to the development of students' CT, Bean and Melzer's (2021) assertion that bullying limits learners' capacity to voice their opinions is in line with the interview findings of the present study. Addressing bullying is crucial for students' self-expression and confidence. Meanwhile, according to UNESCO, it is imperative to address bullying for the enhancement of students' self-expression and confidence (UNESCO, 2019). In addition, several educators opt to integrate CT across various courses instead of treating it as a standalone subject (O'Higgins, 2020). Furthermore, educators in Saudi Arabia express apprehension regarding the inability of their peers to cultivate CT abilities in students as a result of the profoundly entrenched culture of indoctrination prevalent in the country. Additionally, as per the interviewees, this culture of indoctrination had an adverse effect on the self-esteem of certain students and impeded their capacity to engage actively in classroom discussions. The multiple regression analysis also revealed a statistically significant correlation between maternal education level and students' CT skills. Furthermore, in relation to the influence of parental education on CT, the interviewees disclosed that the impact of maternal education was more pronounced than that of paternal education for CT capabilities. Indeed, the cultivation of CT remained unaffected by paternal education. One reason for this result may be that the majority of Saudi women remain at home to care for their children (Human Rights Watch, 2017) and thus have a greater degree of authority than men regarding their children's academic progress. In addition, research has found that unemployed female graduates who remain at home have a positive impact on students' capacity to develop CT abilities. According to Leibbrandt and List

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(2015), male graduates in the USA have an unemployment rate of 7.5%, while the rate among female graduates was 33.5%.

The qualitative and quantitative findings of the current study indicated that a lack of motivation among teachers and students hinders the development of CT skills. To address this issue, teachers should receive specialised training and cultural changes should be made to promote CT among students. This is in line with Allamnakhrah's (2013) findings regarding the need for teacher training and cultural changes to promote CT skills among students. That study highlighted the importance of family environments and cultural changes in fostering CT. Teachers suggested different methods to promote CT, such as problem-solving projects, written compositions, classroom discussions on social issues, and others.

In the past, the Saudi education system emphasised memorisation rather than nurturing CT abilities. It is widely acknowledged that traditional memorisation techniques are insufficient to prepare students for the demands of a rapidly evolving society and economy (Perkins et al., 2018). There has been a shift in focus in the Saudi education system because policymakers are realising the significance of CT skills in a connected global society. Regarding real-world examples, occupations in such fields as engineering and healthcare require the ability to analyse complex data and make informed judgements, making CT skills essential.

This study's findings suggested that Saudi Arabia has made improvements to its educational plan by incorporating CT skills, including analytical thinking and problem-solving skills. The National Transformation Program (NTP) 2020 and Vision 2030 showcase the government's dedication to education sector reform. For example, the Vision 2030 educational initiative, led by the Ministry of Education, aims to promote CT skills among students. Furthermore, the Ministry of Education has set aside funds for teacher training courses that focus on integrating CT into educational methods. The interview data indicated that an increasing number of educators are participating in professional development programmes that emphasise CT pedagogy.

The introduction of a CT module into the formal education system by the Saudi Ministry of Education in 2020 marked a pivotal turning point in educational policy (Al-Otaibi, 2020). This strategic move, aimed at developing Saudi students' CT skills, aligns with a broader shift in educational priorities within the country (Almulla, 2018). Recognising the significance of CT for personal growth and socioeconomic progress, this initiative reflects a proactive approach to preparing students for the challenges of a rapidly evolving global landscape (Bawazeer, 2020).

The inclusion of CT in the formal education system also underscores Saudi Arabia's commitment to benchmarking its educational outcomes on the global stage. This is evidenced by its participation in assessments like the Programme for International Student Assessment (PISA). The acknowledgement of the importance of nurturing CT abilities is not only a national policy objective but also an indication of Saudi Arabia's commitment to international standards of education and competitiveness (Alatawi, 2022).

Alatawi's (2022) findings highlighted the significance of this initiative, emphasising the importance of statistical data in assessing the impact of integrating CT into the education system. This forward-looking policy is likely to contribute not only to individual student development but also to Saudi society's overall advancement, aligning with contemporary educational paradigms that prioritise CT as an essential skill for success in the 21st century.

Conclusions and Implications

The present study has revealed key points that can be organised into six categories. First, it is crucial to integrate CT into the comprehensive national curriculums for secondary and tertiary education. The curriculum should have modules for problem-solving, analytical thinking, and decision-making skills with well-defined learning objectives and assessment

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criteria. Establishing precise rules and guidelines is essential for maintaining uniformity in the education of CT across educational institutions.

Second, a plan for teacher training in CT must be put into action. The training programme should have a structured framework and cover various teaching methods for developing CT in the classroom. Workshops, seminars, and professional development are also important ways for teachers to learn how to foster CT.

Third, active parental involvement is essential for fostering CT skills. Parents should be involved in the learning process that emphasises students' participation in activities requiring CT, according to the findings of this study. In order to accomplish this objective, the government may initiate an awareness campaign that underscores the significance of involving children in extracurricular educational pursuits; this may inspire parents to assume more accountability.

Fourth, government initiatives for extracurricular learning should be established. A public awareness campaign on the importance of extracurricular activities and parental involvement should be launched. This comprehensive campaign should not only highlight the benefits of extracurricular activities but also offer resources for parents and encourage educational institutions to diversify their extracurricular offerings.

Fifth, teacher-student interactions should be enhanced. To that end, a teaching strategy model should be designed and implemented to improve interactions between teachers and students. In addition, a software app should be created to enhance communication, feedback and mentoring between teachers and students. To ensure the successful implementation of a programme or initiative, practical exercises and coaching methods must be incorporated.

Sixth, to address gender stereotypes and inequalities, it is crucial to support the development of female students' CT skills beyond upper-secondary school. Initiatives that aim to improve women's CT skills, support their success in academic settings, and promote their overall personal development should be proposed by individuals involved in the design, implementation, and evaluation of CT programmes. Moreover, these stakeholders, including educators, policymakers, researchers, and other interested parties, should actively advocate for gender equality in CT programmes to tackle existing disparities.

Declaration of Interest

The authors declare no competing interest.

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Appendices

Appendix 1: Results tables

Table 5

Relationship between Critical Thinking Items and Gender

No.	Item	Male	Female	Whitney Mann	*p*
1	I can detect the use of inappropriate emotional language in scientific arguments * GPA Category	216.2	220.0	-.360	.719
2	I have a well-defined goal in mind when I am critical	239.1	211.4	-2.576	.045
3	I can identify the structure of arguments without being distracted by their content	222.7	218.7	-.341	.733
4	Critically thinking is particularly important in psychology	234.1	202.3	-2.692	.007
5	Critical thinking is essential in higher learning and education	209.7	224.3	-1.99	.049
6	When there is a very strong relationship between two variables, we can claim that one causes the other	244.1	192.9	-4.29	< .001
7	Critical thinking develops as you progress through your degree	219.1	223.5	-.391	.696
8	I can express my critical thinking well in my written work	223.3	216.9	-.560	.575
9	You cannot get a good degree without good critical thinking skills	208.4	230.0	-2.01	.045
10	I prefer to do things where there is a quick answer	217.6	220.8	-.281	.779
11	I have a focused and systematic way of thinking	216.8	225.3	-.803	.422
12	All relevant information should be presented in session slides	210.7	233.3	-2.194	.042
13	Generally, I am a good critical thinker	212.4	227.5	-1.93	.048
14	I do well in assessments that ask for critical evaluation	200.4	240.1	-3.48	< .001
15	I think critically while working on my assignments (homework)	216.8	235.5	-1.89	.049
16	All my teachers and peers expect me to think critically	213.0	203.0	-2.00	.045
17	I can use more than one method to deal with complex problems	228.0	223.4	-.877	.380
18	I can get high marks in exams if I can think critically	221.0	211.8	-.793	.428
19	I have the ability to judge the value of new information or evidence presented to me	208.2	228.4	-2.084	.044
20	I can evaluate the arguments of others well	204.0	231.4	-2.472	.013
21	Critical thinking is when you describe what is wrong with something	210.9	220.2	-.822	.411

22	I can say: I am good at looking at the positive and negative sides of things.	211.2	226.8	-.14	.153
23	I think critically while reading	208.7	221.9	-1.14	.253
24	I can rephrase the arguments of others in my own words easily	206.7	232.6	-2.59	.018
25	I think critically in class	198.3	240.0	-3.71	< .001

Table 6

Relationship between Critical Thinking Items and GPA

No.	Item	Mean rank			χ^2	*p*
		70-80	80-90	90-100		
1	I can detect the use of inappropriate emotional language in scientific arguments * GPA Category	201.2	209.6	229.1	5.49	.036
2	I have a well-defined goal in mind when I am critical	2.33.1	218.6	220.0	.682	.711
3	I can identify the structure of arguments without being distracted by their content	245.8	217.4	217.0	2.99	.223
4	Critically thinking is particularly important in psychology	225.8	260.5	203.0	17.8	< .001
5	Critical thinking is essential in higher learning and education	189.3	225.5	218.9	4.0	.134
6	When there is a very strong relationship between two variables, we can claim that one causes the other	215.3	251.2	211.8	8.24	.016
7	Critical thinking develops as you progress through your degree	218.4	212.9	229.9	1.01	.433
8	I can express my critical thinking well in my written work	238.3	221.7	216.6	1.01	.604
9	You cannot get a good degree without good critical thinking skills	222.7	208.3	224.4	1.48	.477
10	I prefer to do things where there is a quick answer	206.3	209.2	227.1	2.63	.269
11	I have a focused and systematic way of thinking	211.3	230.2	219.4	1.32	.516
12	All relevant information should be presented in session slides	223.9	238.9	212.7	3.76	.153
13	Generally, I am a good critical thinker	212.7	209.5	222.7	1.05	.591
14	I do well in assessments that ask for critical evaluation	212.7	201.5	226.0	3..48	.176
15	I think critically while working on my assignments (homework)	252.7	231.4	216.4	5.69	.039
16	All my teachers and peers expect me to think critically	247.6	216.7	212.4	4.44	.109
17	I can use more than one method to deal with complex problems	236.0	188.0	228.4	10.56	.005
18	I can get high marks in exams if I can think critically	225.1	218.3	228.4	.330	.848
19	I have the ability to judge the value of new information or evidence presented to me	208.0	236.8	211.8	6.11	.038
20	I can evaluate the arguments of others well	229.1	212.7	219.3	.886	.642
21	Critical thinking is when you describe what is wrong with something	224.1	214.6	213.9	.393	.822
22	I can say: I am good at looking at the positive and negative sides of things	235.5	223.5	212.4	2.356	.308
23	I think critically while reading	225.0	204.7	217.0	1.33	.514

24	I can rephrase the arguments of others in my own words easily	227.9	191.8	245.4	10.69	< .001
25	I think critically in class	204.3	216.1	220.4	.955	.620

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