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Impact of Reading Competencies on Scientific Literacy for Social Science Students

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The given research was implemented in order to investigate the correlation between reading comprehension awareness and scientific literacy of end-of-year students pursuing final-year programmes in social sciences (Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies) in a developing university. In this regard, the research was to find out whether there was a departmental disparity in achievements of social sciences students in reading comprehension and scientific literacy, and whether there was a correlation between the two skills. The methodology of the study was developed in 2 stages. The first stage involved a scale that was used to establish the level of the self-efficacy of the participants in their reading comprehension. The second stage of the research involved information literacy/critical thinking questions on a text that had the topics of health, nutrition, and food in relation to day-to-day life. The overall results acquired during the study show that even though the students were scoring high in the reading comprehension self-efficacy scale, their level of scientific literacy was lower than expected. The results illustrate that there are challenges in scientific process abilities including reading comprehension and interpretation, presenting scientific evidence, and scientific reasoning. The correlation studies validate the fact that the presence of reading comprehension skills is not enough to be scientifically literate and that such skills must be nurtured. The findings of the research indicate that the objective of the education system which implies that every citizen should be scientifically literate has some weaknesses. Considering these outcomes, it is implied that the curricula of social sciences need to be enhanced to train the abilities of scientific reasoning, and the additional programmes are to be proposed to enhance the levels of student competencies on this matter.

Keywords: scientific literacy, critical thinking, social science students, academic achievement, reading comprehension, critical inquiry

Introduction

The mid-20th century, the Atomic Age, which witnessed the birth of nuclear technology after World War II, showed the world that science was a key determinant not only of progress but also of ethical and social accountability. The devastating effects of the atomic bomb made the impression that science has on humanity clear and supported the notion that science as a field of consciousness must be a part of experts, but of the whole citizens.

This realisation took a turn with a sharp twist in 1957 as the Soviet Union delivered Sputnik 1, the first artificial satellite, into the orbit round the earth, a move that signalled a radical change not only in the space

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exploration, but also in the policy-making aspects of science and education. This incident turned into a cliched representation of the historical confrontation between the United States and the Soviet Union that worsened the US paranoia about lagging behind in scientific progress. The strategic value of scientific knowledge in the security of the nation, economy, and social well-being was evident with the disruptive influence of Sputnik.

Here, the US started searching an answer to the question: What type of a citizen profile shall be developed to become a powerful country in the world?

The answer to this question was that more scientifically literate people needed to be generated and the term scientific literacy started to be employed in the late 1950s (Hurd, 1958; Curdy, 1958). Subsequently, with the introduction of scientific literacy as the new vision in science education in the US, new curricula were produced incorporating the natural sciences in conjunction with life, society and technology (Solomon & Aikenhead, 1994; Aikenhead, 2003), and scientific literacy was made an inescapable part of science curricula (American Association for the Advancement of Science [AAAS], 1993). In this context, different scientific literacy models have been developed; the Science-Technology-Society-Environment (STSE) approach has emerged as one of the important examples of these models (Yörük Zan, 2008).

The educational projects that have been created in this time were intended to bring about students not just as people who receive information, but as people who can understand information and situate it within its social framework. The combination of sciences and reading in specific, focused on the linguistic preconditions of scientific thought; scientific literacy became placed in the common denominator of not just science education, but also language education (Yore, Bisanz, & Hand, 2003). The following strategies were embodied in curriculum changes devised since the 1950s that resulted in newer instructional models which linked the natural sciences with life, society and technology (AAAS, 1993).

Likewise, in Turkey, the development of scientifically literate individuals has taken the position of a major principle in science education curricula that have been developed since the 2000s. According to the 2004, 2013, and 2018 Science Course Curricula of the Ministry of National Education, the skills of access to scientific knowledge, the ability to question, the ability to relate to everyday life, and the skills of the scientific process were highlighted on the competencies of students of the course (MEB, 2018). Aydoğdu (2006) also drew attention to the factors affecting scientific process skills in science education. A newer iteration of the programme that was implemented in the education system in 2023 under the title of Turkey Century Education Model (Türkiye Yüzyili Maarif Modeli) offered a more comprehensive approach to the concept of scientific literacy, considering the individual as a entirety with cognitive, affective, social, and value aspects.

In the digital era, when the amount of scientific information grows fast, and the sources of information diversify, the skills of reading and comprehending scientific texts critically are significant not only to academic success, but to the formation of the conscious sense of citizenship (Aşıcı, 2009). Aydın and Tarakçı (2018) also emphasize that students need to interpret and analyze visual and numerical information critically. Therefore, scientific literacy and reading skills remain one of the most debated topics in modern education. In this context, the ability to interpret graphs and other visual representations is also an important component of scientific literacy (Bayazıt, 2011). Thus, scientific literacy and reading skills continue to be one of the most discussed topics of modern education. Reading and reading comprehension is defined as part of the cognitive process that a student forms by examining the information obtained from reading, systematically categorizing it, evaluating it through correlation, and relating it to prior knowledge if any (Güneş, 2009; Epçaçan, 2009; Yıldız & Akyol, 2011).

According to this definition, reading and reading comprehension skills are considered among the important variables affecting students' personal and academic development (Yıldız & Akyol, 2011). However, it is stated that the level of reading comprehension is influenced by various factors such as the individual's desire to understand, interest in the subject, existing judgments, and reading purpose (Epçaçan, 2009). Accordingly, it is stated that a decrease in reading habits has significant consequences for students' academic development and literacy practices (Bircan & Tekin, 1989). Recent evidence also suggests that reading comprehension is one of the strongest cognitive predictors of scientific literacy, although its influence varies depending on learners' cognitive characteristics and disciplinary context (Sun et al., 2025). Based on this definition, reading and reading comprehension are considered important variables affecting a student's personal and academic development (Yıldız & Akyol, 2011); moreover, the level of reading comprehension is thought to be influenced by the individual's willingness to comprehend, interest in the subject, judgments, and reading purpose (Epçaçan, 2009).

The skill of reading comprehension, defined as the first step in academic life, is known to have positive or negative effects on a student's entire lifelong learning processes (Yılmaz, 2008). Scientific literacy develops through intentional learning experiences that combine inquiry, discussion, and reflective thinking rather than through reading alone (Roy et al., 2025). Recent studies also emphasize that scientific literacy should be examined beyond science classrooms and across interdisciplinary learning environments (Fujinami et al., 2025). Bloom (1995) demonstrated a relationship between proficiency in reading comprehension skills and students' success in mathematics, science, language, and literature courses (cited by Yılmaz, 2008). Proceeding from this point, a study was planned to examine the scientific literacy skills of undergraduate social science students, whom the MEB science curriculum aims to educate. The study aims to investigate the effect of social science students' reading comprehension awareness on their scientific literacy.

Purpose of the Study and Research Questions

The main objective of this study is to scientifically determine the relationship between the reading comprehension awareness and scientific literacy skills of final-year students enrolled in social sciences programs (Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies) at a developing university.

Within this scope, answers were sought for the following research questions:

1. Is there a statistically significant difference among the final-year students in the Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies programs regarding their reading comprehension self-efficacy scale scores?

2. Is there a statistically significant difference among the final-year students in the Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies programs regarding their scientific literacy achievement levels?

3. Is there a significant relationship between the reading comprehension self-efficacy scale results and the scientific literacy achievement levels of the final-year students in the Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies programs?

Limitations of the Study

The limitations of the research are as follows:

- The research is limited to students in specific departments (Information and Document Management,

Geography, Philosophy, Turkish Language and Literature, and Islamic Studies) at only one university. This make it difficult to generalize the findings to all social sciences students.

- The study was conducted only with final-year students. Therefore, no inferences can be made about the status of students in earlier or intermediate grades.
- The scientific literacy questions were focused on the themes of health, food, and nutrition. This is inadequate for assessing knowledge and skills in other scientific domains.
- The study was conducted within a specific timeframe, the 2024-2025 academic year. Therefore, the findings not fully reflect the current situation.
- The research utilizes a self-report scale (reading comprehension self-efficacy scale). As such scales are based on participants' perceptions, they reflect personal opinions rather than objective results.

Significance of the Study

Scientific literacy has become a critical skill for every citizen in today's information age. This study reveals the current status of the scientific literacy vision—a major goal of the education system—among social sciences students at the university level.

Furthermore, by examining the state of scientific literacy skills—which are traditionally associated with the natural sciences—among social sciences students, this study offers a valuable contribution to understanding the interaction between these two disciplines.

Methodology

Study Design

This study was conducted with social sciences students enrolled in the departments of Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies. It aimed to reveal the relationship between their reading comprehension awareness and scientific literacy skills.

The study was carried out in two main stages:

- First Stage: The reading comprehension self-efficacy scale was administered to the participants.
- Second Stage: Students were presented with a scientific literacy text covering the themes of health, nutrition, and food drawn from daily life, along with related questions.

Data Analysis

The students' answers to the scientific questions were compared by department, and the correlation between the scientific literacy scores and the reading comprehension scale results was examined. The coded research data were recorded into the SPSS 22 program. Findings were interpreted according to a significance level of 0.05. In light of the collected data, the social sciences students' responses to the scientific questions were compared by department, and the connection between the students' scientific literacy scores and their reading comprehension scores was evaluated.

Data Collection Instruments

Reading Comprehension and Self-Efficiancy Scale

The data collection process in this research was carried out in two main stages. In the first stage, the scale developed by Epçaçan and Demirel (2011) was used to determine the participants' reading comprehension self-efficacy levels. Details of Scale was given in Table 1. This 27-item scale covers the themes of written and visual

comprehension, self-regulation in reading, and high self confidence regarding reading. In the study conducted by Epçaçan and Demirel, the reliability of the scale was calculated to be a Cronbach's Alpha coefficient of 0.88. In the present study, the reliability coefficient of the scale was found to be 0.77. The participants' level of agreement with the themes was assessed using a 5-point Likert-type scale (1 = "Not Sure at All," 2 = "Very Little Sure," 3 = "Somewhat Sure," 4 = "Quite Sure," 5 = "Completely Sure").

Table 1

Details of Reading Comprehension and Self-Efficiancy Scale

Themes	Item	Score (Min)	Score (Max)
Written And Visual Comprehension (WVC)	11 item	11	55
Self-Regulation in Reading (SRR)	9 item	9	45
High Self Confidence Regarding Reading (HCR)	7 item	7	35
Total		27	135

Scientific Literacy Questions

In the second stage, seven questions focusing on the themes of health, nutrition, and food—selected from daily life—were determined to measure scientific literacy skills. These questions were adapted from the 2018 PISA (Programme for International Student Assessment) examinations and sample questions published by the Ministry of National Education. Exam question details and question scoring information are provided in Table 2.

Table 2

Exam Question Details and Question Scoring Information

Question	Cognitive Process	Question type	Score	
Q1	Expressing the literal meaning	Simple Multiple-Choice (1 Question, 4 options)	8	
Q2	Reflecting on the text's content and form	Simple Multiple-Choice (1 Question, 4 options)	8	
Q3	Reflecting on the text's content and form	Complex Multiple-Choice (3 Questions, 2 options)	8 8 8	(24)
Q4	Expressing the literal meaning	Open Ended	10	
Q5	Synthesizing information from various sources to reach new conclusions	Complex Multiple-Choice (4 Questions, 2 options)	8 8 8 8	(32)
Q6	Identifying contradictory situations and developing solutions	Simple Multiple-Choice (1 Question, 4 options)	8	
Q7	Identifying contradictory situations and developing solutions	Open Ended	10	
TOPLAM			100	

The linguistic and content validity of the questions was examined by field experts and confirmed to be high. The assessment was designed to evaluate students' ability to interpret and critically evaluate scientific information presented in authentic contexts. This approach is consistent with recent research demonstrating that interpreting socio-scientific texts and image-text materials constitutes an important dimension of scientific

literacy assessment (Pun et al., 2025). The scientific literacy questions were used in the study to assess the skills of:

- Determining the accuracy and reliability of information sources,
- Identifying and comparing arguments, and
- Integrating information and reflecting deeply.

Sample of the Study

This study was conducted with the voluntary participation of a total of 180 final-year social sciences students (n = 180) enrolled in the departments of Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies.

Findings

This study was conducted with 180 students to investigate the effect of reading comprehension awareness on scientific literacy among final-year students enrolled in the departments of Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies. The findings obtained from the study are presented below.

Demographic Findings

Under the heading of demographic and personal findings, data regarding gender and departmental information were examined and are presented in Table 3.

Of the total 180 students who participated in this research, 139 (77.2%) were female, and 41 (22.8%) were male students.

Looking at the distribution of students by department: 35 individuals (19.44%) from the Information and Records Management department, 37 individuals (20.56%) from the Islamic Studies department, 34 individuals (18.89%) from the Turkish Language and Literature department, 35 individuals (19.44%) from the Philosophy department, and 39 individuals (21.67%) from the Geography department participated in the study.

These findings indicate that the study's sample is predominantly female and shows a balanced distribution across the departments.

Table 3

Descriptive Data on Gender and Departmental Information

Descriptive statistics for gender		
	Frequency (n)	Percentage (%)
Female	139	77.2
Male	41	22.8
Total	180	100.0
Descriptive statistics for department		
	Frequency (n)	Percentage (%)
Information and Records Management	35	19.44
Islamic Sciences	37	20.56
Turkish Language and Literature	34	18.89
Philosophy	35	19.44
Geography	39	21.67
Total	180	100.0

Reading Comprehension Skills by Department

The Reading Comprehension Self-Efficacy Scale was administered to final-year students enrolled in the departments of Information and Records Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies.

Before conducting hypothesis tests on the scores obtained from the scale, a one-sample Kolmogorov-Smirnov test was performed to determine whether the data followed a normal distribution. The result of the test indicated that the significance value (Asymp. Sig. = *p*) was less than 0.05. Therefore, non-parametric test methods were utilized in the study.

The Reading Comprehension Self-Efficacy Scale applied to the students has the following sub-categories: Written and Visual Comprehension (WVC), Self-Regulation in Reading (SRR), and High Self Confidence Regarding Reading (HCR). Descriptive statistics, including the mean scores of the Reading Comprehension Self-Efficacy Scale by department for the relevant categories and the scale total, are presented in Table 4. The total scale score reflects the participants' overall performance in the relevant reading skills and attitudes. The department with the highest overall mean score was Geography (116.62). The department with the lowest overall mean score was recorded as Islamic Studies (111.84). The departments' general performance means range between 111.84 and 116.62, which indicates that the overall performance among departments is distributed within a relatively narrow range (with a difference of approximately 4.78 points). When evaluating Written and Visual Comprehension competencies, the Information and Records Management (IRM) department was observed to have the highest mean score (50.47), while the Islamic Studies department had the lowest mean score in this area (43.72). When evaluating Self-Regulation in Reading competencies, the Geography department was found to reach the highest mean for self-regulation in reading skills (38.66), while the Information and Records Management (IRM) department reached the lowest mean score in this area (35.22). When measuring High Confidence Regarding Reading levels, the Turkish Language and Literature (TLL) department was found to have the highest mean score (29.78) for high confidence regarding reading, while the Islamic Studies department had the lowest mean score in this area (27.77).

Table 4

Mean Scores of Reading Comprehension Self-Efficacy Scale by Department

	WVC	SRR	HCR	Scale	
	Mean	Mean	Mean	Mean	N
IRM	50.47	35.22	28.75	113.51	35
Islamic Sciences	43.72	36.11	27.77	111.84	37
TLL	47.65	38.45	29.78	115.89	34
Philosophy	48.21	38.01	29.13	115.35	35
Geography	48.25	38.66	29.71	116.62	39
Total	47.6500	37.7278	29.2278	114.5722	180

The Kruskal-Wallis H Test was applied to find out whether there was a statistically significant difference in the students' reading comprehension self-efficacy scale achievements (sub-categories and total scale score) across departments. The Kruskal-Wallis H Test is a non-parametric test used to determine if there is a statistically significant difference among the scores (medians) of the five different academic departments' participants for the relevant variable. The data related to the Kruskal-Wallis test are presented in Table 5.

There was a statistically significant difference found among the medians of the Total Scale ($X^2(4) = 13.450$ $p = 0.009$). Based on the $\alpha = 0.05$ significance level, the p value (0.009) is less than α (α < 0.05). This result means that there is a difference among the groups. When the mean ranks are examined, the Geography department has the highest average (Mean Rank = 109.17), while the Islamic Studies department has the lowest average (Mean Rank = 71.16). This result shows that Geography students have a significantly higher tendency in terms of reading comprehension self-efficacy compared to students from the other departments.

A statistically significant difference was also determined among the departments for the High Self Confidence Regarding Reading (HCR) variable (α < 0.05), ($X^2(4) = 10.614$; $p = 0.031$). According to the mean ranks, the department with the highest confidence level was Turkish Language and Literature (TLL) (Mean Rank = 105.81), and the department with the lowest confidence level was again Islamic Studies (Mean Rank = 75.44). This finding indicates that the TLL students' high confidence level toward reading significantly differs from that of the Islamic Studies students.

The difference among the medians of the departments' Self-Regulation in Reading (SRR) was not found to be statistically significant (α > 0.05), ($X^2(4) = 9.126$; $p = 0.058$). Although the significance value is very close to the α = 0.05 limit, this finding suggests there is no generalizable difference among departments in terms of students' skills in planning, monitoring, and evaluating their reading processes.

A statistically significant difference was also not detected in the Written and Visual Comprehension (WVC) variable (α > 0.05), ($X^2(4) = 8.441$; $p = 0.077$). This situation reveals that the departments are at similar levels in terms of their competence in comprehending written and visual materials.

Evaluation of Scientific Literacy Exam Achievement Scores by Department

Questions selected from the 2018 PISA exam were administered to measure the students' scientific literacy skills. To determine whether the data followed a normal distribution before conducting hypothesis tests on the scores obtained from the science exam, a one-sample Kolmogorov-Smirnov test was performed. The evaluation result of the test found that the significance value (Asymp. Sig.= p) was less than 0.05. Therefore, non-parametric test methods were used in the study.

The descriptive statistics for the results obtained by final-year students enrolled in the departments of Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies on the science exam are presented in Table 6. Table 6 presents the participants' mean scores for the relevant variable, their standard deviations showing the dispersion of scores, and the number of participants in each group. As a result of the evaluations conducted, the overall mean for the total of 180 students from five different departments was calculated to be 69.6056.

The mean scores of the departments show significant differences around this overall average. The department with the highest mean score was the Information and Records Management department (75.8857). This department is followed by the Philosophy department (75.4000) with a very close mean. The department with the lowest mean score was determined to be Geography (62.5897). The Islamic Studies department (3.3529) is located just above this department. The Turkish Language and Literature (TLL) department (71.3243) is positioned close to the overall mean but lower than IRM and Philosophy.

Standard deviation scores were calculated to determine how much the departmental scores deviated from the mean. The Philosophy department was found to be the most homogeneous group with the lowest standard deviation (17.20841), while the Turkish Language and Literature (TLL) (21.25644) and Geography (21.27232)

departments were identified as the most heterogeneous groups, possessing the highest standard deviations.

Table 5

Kruskal-Wallis Test for Reading Comprehension Skills by Department

	WVC	SRR	HCR	Scale	
	Mean Rank	Mean Rank	Mean Rank	Mean Rank	N
IRM	79.40	80.99	78.19	79.69	35
Islamic Sciences	75.72	75.25	75.44	71.16	37
TLL	99.76	101.16	105.81	102.61	34
Philosophy	90.59	86.89	87.41	86.50	35
Geography	104.49	105.46	102.92	109.17	39
	WVC	SRR	HCR	Scale	
Chi-Square	8.441	9.126	10.614	13.450	
Df	4	4	4	4	
Asymp. Sig.	0.077	0.058	0.031	0.009	

Table 6

Departmental Averages of Exam Results

Department	N	Mean	Std. Deviation	Sum
IRM	35	75.8857	19.73914	2656.00
Islamic Sciences	37	63.3529	20.07242	2154.00
TLL	34	71.3243	21.25644	2639.00
Philosophy	35	75.4000	17.20841	2639.00
Geography	39	62.5897	21.27232	2441.00
Total	180	69.6056	20.60360	12529.00

The answers given by the students to the scientific literacy exam questions were evaluated according to the created answer key (detailed score tool). The mean scores obtained by each department for each science question are presented in Figure 1.

Figure 1 shows the distribution of total scores obtained from the science questions by department. Generally, the figure indicates that the success profiles of the departments in the science questions are not homogeneous, and some departments are in a more advantageous position than others in certain question types. This distribution, based on the total scores of the question groups from Q1 to Q7, reflects the different levels of departments in scientific literacy and problem-solving skills.

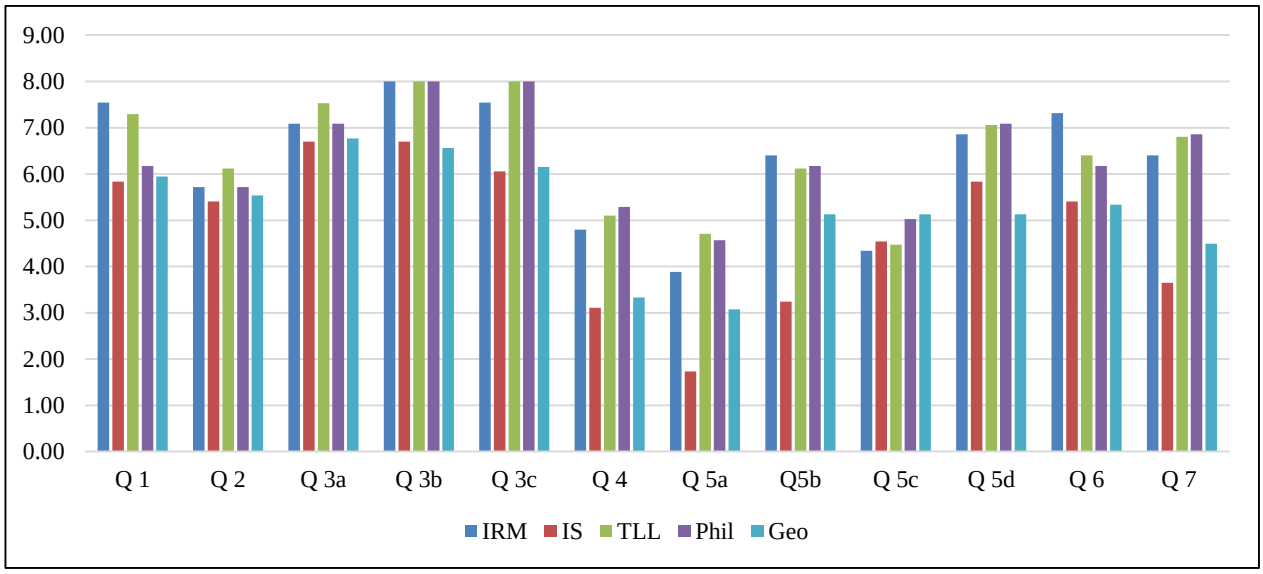

Figure 1. Distribution of total scores on science questions by department.

Table 7 summarizes the distribution (frequency: *n* and percentage: *f*) by department of the answers given to the multiple-choice and open-ended questions asked in the science exam by a total of 180 final-year students enrolled in the departments of Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies. Table 5 descriptively reveals the differences in the levels of knowledge and conceptual misunderstanding among the departments by presenting the correct and incorrect answer rates on a question-by-question basis comparatively.

The first question's information literacy levels were analyzed in line with the students' answers as follows:

While IRM and TLL department students have high information literacy with rates of 94.3% and 91.2% respectively, students from Islamic Studies, Geography, and Philosophy departments are observed to remain at a medium level in reading comprehension questions based on in-text information requiring inference and matching.

IRM and TLL department students gave a high proportion of correct answers in skills of direct information extraction and summarizing/interpreting. Their ability to establish the Evidence-Claim relationship was determined to be strong. They were able to eliminate the distractors in the text.

Philosophy department students (77.1%), Geography department students (74.4%), and Islamic Studies students (73%) gave correct answers. The most critical issue that can be stated is that they preferred the distractor option that did not contain a quantitative comparison. This situation indicates a deficiency in content interpretation and matching skills. Furthermore, there are students who preferred options that were clearly rejected or contained contradictions in the given text. This indicates a lack of sensitive reading and the ability to filter information while working with the text. To state their percentages: 22.9% of Philosophy students, 25.6% of Geography students, and 27% of Islamic Studies students struggled to eliminate the incorrect option.

In the 2nd question, students' information literacy levels are interpreted through determining text purpose and synthesis. TLL department students (76.5%) gave correct answers and were the group that best synthesized the main purpose. The rate of falling for the distractor among IRM and Philosophy group students was 28.6% and 20%, respectively. This indicates that the students could not synthesize the entire text they read and could not determine the most comprehensive judgment. The students missed the general situation by focusing on a detail present in the text.

Islamic Studies and Geography group students marked an option that was irrelevant/contradictory to the given text at rates of 13.5% and 12.8% respectively. This reveals that they struggled with their ability to eliminate false information.

In the 3rd question, part A, information literacy was examined through students' abilities to read critical and questioning texts, understand the author's purpose, and understand opposing claims.

The success rates of TLL (94.1%), Philosophy (88.6%), and IRM (88.6%) group students follow each other. Students from these three departments were able to determine the main purpose of the text at similar rates. This indicates that they possess higher-level thinking skills (critical thinking and inference). Geography (84.6%) and Islamic Studies (83.8%) group students were found to have difficulty questioning the main purpose of the text or were unsuccessful in the skill of refuting opposing claims.

The question in part B inquires about the most fundamental and concrete purpose. An answer requiring direct inference is expected. The 100% success of IRM, TLL, and Philosophy group students documents the strength of these groups' basic information literacy and ability to understand the text's function. The incorrect answer rates for Geography and Islamic Studies group students are 16.2% and 17.9%, respectively. The high rate of incorrect answers among students in these departments indicates that there are students who failed to grasp the text's function. This points to the fact that Islamic Studies and Geography department students experience difficulty in reading comprehension and inference skills.

The information literacy levels of TLL (100%), Philosophy (100%), and IRM (94.3%) group students are at a high level in the skill of resolving contradictions and verifying in-text evidence. Islamic Studies (75.7%) and Geography (76.9%) group students, however, struggled with this basic verification skill. A noticeable low level is observed in the skills of information verification, alertness, and resolving basic contradictions. The high proportion of students in these groups accepting an option that is contradictory to the information explicitly stated in the text signals a significant deficiency in information literacy.

The 4th question was prepared as an open-ended question. This type of question measures not only reading comprehension but also skills in recalling information, expressing it with the correct words, and answering discipline (not leaving it blank).

TLL and IRM department students are successful in the skill of finding, recalling, and expressing in-text details. This indicates a high ability in effective text utilization and activating information.

Islamic Studies and Geography students preferred to leave the open-ended question unanswered, with approximately 45% of students in both departments choosing not to attempt a response. They were identified as the groups that experienced the greatest difficulty and demonstrated the lowest level of effort in answering the open-ended question. This finding suggests deficiencies in basic reading comprehension skills (i.e., the ability to locate relevant information within the text) or in response discipline.

Philosophy group students are unsuccessful in direct detail extraction and written expression. 15.2% of Philosophy group students gave a full answer. The fact that 48.6% of students gave partial answers indicates that they generally understood the text but could not find and fully convey a specific detail.

Question 5a: This question examined information literacy levels through Objective/Subjective distinction and judgment application skills beyond merely understanding the text content. Islamic Studies achieved a 78.4% success rate, while the success rates were 41.2% for TLL, 42.9% for Philosophy, and 38.5% for Geography. In groups other than the Islamic Studies undergraduate program students, the conceptual understanding and application level regarding the linguistic distinction between objective and subjective are low. Students struggled

to grasp that the word “is surprising” in the question constitutes a subjective judgment reflecting the author’s personal feeling, and is therefore not an objective statement.

Question 5b: Students successfully understood that expressions such as “studies show” convey a verifiable fact (datum) and serve as the core basis for objectivity within the text. IRM group students demonstrated success at a rate of 80% in determining the reliability and type of information originating from scientific and official sources. Islamic Studies group students showed a 59.5% success rate in determining the objective judgment, making them the group that struggled the most with this task. The success rate was 70.6% for TLL, 68.6% for Philosophy group students, and 64.1% for Geography group students.

Question 5c: This question requires the determination of an objective judgment. The overall success in answering this question was found to be low. Islamic Studies achieved a 75.7% success rate in this question. A high ability to determine an objective action in the fact of “reporting studies” is observed. IRM and Philosophy group students (54.3%) fell below the average in this question. The objective and subjective distinction appears to be a quite critical distinction for university students. Consequently, students are observed to struggle with making the subtle distinction between reporting an action (part of information literacy) and a personal value judgment.

Question 5d: This question required the determination of a subjective judgment, and a high overall success rate of 81.1% was observed. This suggests that the skill of recognizing that words indicating value judgments like “best-worst” are subjective is well developed. Philosophy group students (88.6%) and TLL group students (88.2%) were successful in distinguishing all value judgments. This proves that the students’ ability to apply linguistic concepts and their critical thinking skills are developed. Islamic Studies (73%) and Geography (71.8%) group students had a high error rate in the objective-subjective distinction. In conclusion, students are observed to struggle with distinguishing the subjective statement.

The 6th question measures students’ ability to read two contradictory texts and identify the core subject of disagreement between them. IRM (91.4%) and TLL (88.2%) group students correctly synthesized the topic the two texts fundamentally debated. They correctly synthesized the fundamental difference of opinion. The distractor option was the strongest trap for Islamic Studies (67.6%) and Geography (66.7%) group students. This points to a tendency in this group of students to incorrectly evaluate a detail mentioned in the text as the fundamental disagreement. These groups struggled with comparative reading and main idea synthesis skills. Philosophy group students (85.7%) can be said to have strong skills in identifying logical contradictions.

The 7th and final question is the type of question that requires the highest level of cognitive skills (synthesis, critique, justification) among the other questions. The student was asked to select the most balanced view and defend this choice with correct evidence from the text. In this question, Philosophy group students were the most successful group in evaluating two opposing pieces of evidence and reaching a cautious, logical conclusion, as a result of their critical thinking discipline.

Islamic Studies students had a high rate of invalid answers. The rate of Geography group students leaving the question blank suggests a tendency for students to avoid high-risk, time-consuming, and complex questions or to have difficulty formulating their answers.

Table 7

Departmental Distribution of Student Responses

Questions		IRM		IS		TLL		Phil		Geo		Total	
		n	f	n	f	n	f	n	f	n	f	n	f
Q 1	True choice (B)	33	94.3	27	73.0	31	91.2	27	77.1	29	74.4	147	81.7
	False choice (A)	0	0.0	2	5.4	1	2.9	2	5.7	3	7.7	8	4.4
	False choice (C)	2	5.7	5	13.5	2	5.9	4	11.4	4	10.3	17	9.4
	False choice (D)	0	0.0	3	8.1	0	0.0	2	5.7	3	7.7	8	4.4
		35	100	37	100	34	100	35	100	39	100	180	100
Q 2	True choice (D)	25	71.4	25	67.6	26	76.5	25	71.4	27	69.2	128	71.1
	False choice (A)	0	0.0	0	0.0	6	17.6	7	20.0	5	12.8	18	10.0
	False choice (B)	10	28.6	7	18.9	2	5.9	3	8.6	2	5.1	24	13.3
	False choice (C)	0	0.0	5	13.5	0	0.0	0	0.0	5	12.8	10	5.6
		35	100	37	100	34	100	35	100	39	100	180	100
Q 3a	True choice (A)	31	88.6	31	83.8	32	94.1	31	88.6	33	84.6	158	87.8
	False choice (B)	4	11.4	6	16.2	2	5.9	1	2.9	6	15.4	19	10.6
		35	100	37	100	34	100	35	100	39	100	180	100
Q 3b	True choice (A)	35	100	31	83.8	34	100	35	100	32	82.1	167	92.8
	False choice (B)	0	0.0	6	16.2	0	0.0	0	0.0	7	17.9	13	7.2
		35	100	37	100	34	100	35	100	39	100	180	100
Q 3c	True choice (A)	33	94.3	28	75.7	34	100	35	100	30	76.9	160	88.9
	False choice (B)	2	5.7	9	24.3	0	0.0	0	0.0	9	23.1	20	11.1
		35	100	37	100	34	100	35	100	39	100	180	100
Q 4	Full	13	37.1	8	21.6	13	38.2	15	42.9	10	25.6	59	32.8
	Missing	8	22.9	7	18.9	9	26.5	17	48.6	6	15.4	47	26.1
	Invalid	4	11.4	5	13.5	4	11.8	3	8.6	5	12.8	21	11.7
	Empty	10	28.6	17	45.9	8	23.5	10	28.6	18	46.2	63	35.0
		35	100	37	100	34	100	35	100	39	100	180	100
Q 5a	True choice (A)	17	48.6	8	21.6	20	58.8	20	57.1	15	38.5	80	44.4
	False choice (B)	18	51.4	29	78.4	14	41.2	15	42.9	24	61.5	100	55.6
		35	100	37	100	34	100	35	100	39	100	180	100
Q 5b	False choice (A)	7	20.0	12	32.4	8	23.5	8	22.9	14	35.9	49	27.2
	True choice (B)	28	80.0	15	40.5	26	76.5	27	77.1	25	64.1	121	67.2
		35	100	37	100	34	100	35	100	39	100	180	100
Q 5c	True choice (A)	19	54.3	21	56.8	19	55.9	22	62.9	25	64.1	106	58.9
	False choice (B)	16	45.7	16	43.2	15	44.1	13	37.1	14	35.9	74	41.1
		35	100	37	100	34	100	35	100	39	100	180	100
Q 5d	False choice (A)	5	14.3	10	27.0	4	11.8	4	11.4	14	35.9	37	20.6
	True choice (B)	30	85.7	27	73.0	30	88.2	31	88.6	25	64.1	143	79.4
		35	100	37	100	34	100	35	100	39	100	180	100
Q 6	True choice (A)	32	91.4	25	67.6	27	79.4	27	77.1	26	66.7	137	76.1
	False choice (B)	0	0.0	2	5.4	2	5.9	3	8.6	2	5.1	9	5.0
	False choice (C)	3	8.6	10	27.0	4	11.8	5	14.3	10	25.6	32	17.8
	False choice (D)	0	0.0	0	0.0	1	2.9	0	0.0	1	2.6	2	1.1
		35	100	37	100	34	100	35	100	39	100	180	100
Q 7	Full	20	57.1	10	27.0	19	55.9	20	57.1	15	38.5	84	46.7
	Missing	8	22.9	7	18.9	8	23.5	8	22.9	5	12.8	36	20.0
	Invalid	3	8.6	8	21.6	3	8.8	2	5.7	8	20.5	24	13.3
	Empty	4	11.4	12	32.4	4	11.8	5	14.3	11	28.2	36	20.0
		35	100	37	100	34	100	35	100	39	100	180	100

The Kruskal-Wallis H Test was applied to find out whether there was a statistically significant difference among the students' scientific literacy exam achievements. The Kruskal-Wallis H Test is a non-parametric test used to determine Dif there is a statistically significant difference among the scores (medians) of the participants across five different academic departments for the relevant variable. The data related to the Kruskal-Wallis test are presented in Table 8.

The Chi-Square test statistic obtained from the analysis was reported as 15.120, and the significance level was $p = 0.004$ ($X^2(4) = 15.120$; $p = 0.004$). Based on the $\alpha = 0.05$ significance level, the p value (0.004) is less than α ($\alpha < 0.05$). This result means that there is a difference among the groups. Accordingly, it is understood that there is a statistically significant difference among the medians of the scientific literacy scores of final-year students studying in the Information and Document Management, Islamic Studies, Turkish Language and Literature, Philosophy, and Geography departments.

Table 8

Science Literacy Scores According to Departments

Department	N	Mean Rank	Chi-Square	df	Asymp. Sig.
IRM	35	108.09			
Islamic Sciences	37	72.37			
TLL	34	96.34	15.120	4	0.004
Philosophy	35	103.59			
Geography	39	73.24			

In order to determine the source of the statistically significant difference found among the medians of the scientific literacy scores of final-year students studying in the departments of Information and Document Management, Islamic Studies, Turkish Language and Literature, Philosophy, and Geography, pairwise comparisons were performed using the Bonferroni test.

As a result of the pairwise comparisons, a statistically significant difference was detected between only one pair of departments. There is a statistically significant difference in Exam Result scores between the IRM (Information and Document Management) and Geo (Geography) departments ($p = 0.048$). This difference is located just below the $\alpha = 0.05$ threshold with a p value of 0.048.

The Mean Difference (I-J) value is 13.29597 (IRM - Geo), and this positive difference indicates that the IRM department's average exam result is significantly higher than that of the Geography department.

Reading Comprehension Scale Results and Scientific Literacy Achievement Levels by Department

Spearman Rank Correlation analysis was conducted to examine the relationship between the Reading Comprehension Self-Efficacy Scale scores and the Scientific Literacy Exam scores of a total of 180 final-year students enrolled in the departments of Information and Document Management, Geography, Philosophy, Turkish Language and Literature, and Islamic Studies. The results are presented in Table 9. The analyses indicate that the relationship between these two variables does not exhibit a consistent pattern across the departments examined.

A significant relationship was found between the scores obtained by students from the Information and Records Management and Philosophy departments on the reading comprehension self-efficacy scale and the scores obtained from the science exam ($p < 0.05$).

A statistically highly significant (p = 0.000) and very strong, positive correlation coefficient (r = 0.995) was found between the scores obtained by Information and Records Management department students on the Reading Comprehension Self-Efficacy Scale and their Scientific Literacy Exam scores. This finding explains that in IRM students, reading comprehension self-efficacy scores parallel their science exam success. Similarly, a statistically highly significant (p = 0.000) and very strong, positive relationship (r = 0.986) was determined between the two variables for Philosophy students. This situation indicates that the Reading Comprehension Self-Efficacy Scale evaluations and scientific exam skills support each other in the Philosophy department.

A significant relationship was not detected (p > 0.05) between the scores obtained by students from the Islamic Studies, Turkish Language and Literature, and Geography departments on the reading comprehension self-efficacy scale and the scores obtained from the science exam. For Islamic Studies (IS) students, no relationship was detected between the scores obtained from the Reading Comprehension Self-Efficacy Scale and the scores obtained from the Science Exam (p = 0.922). The correlation coefficient obtained (r = -0.17) is very weak and negative. For Turkish Language and Literature (TLL) students, no relationship was detected between the scores obtained from the Reading Comprehension Self-Efficacy Scale and the scores obtained from the Science Exam (p = 0.985). The correlation coefficient (r = 0.003) indicates a negligible, almost non-existent relationship. For Geography students, no relationship was detected between the scores obtained from the Reading Comprehension Self-Efficacy Scale and the scores obtained from the Science Exam (p = 0.371). The correlation coefficient (r = -0.147) is very weak and negative.

Table 9

Relationship Between Reading Comprehension Scale Results and Scientific Literacy Achievement Levels by Department

Department	Reading Comprehension Scale		Science Literacy Exam		Spearman	R
	Mean	Std. Dev.	Mean	Std. Dev.	*p*	Correlation Coefficient
IRM	113.4857	4.29344	75.8857	19.73914	0.000	0.995
IS	112.1471	6.13550	63.3529	20.07242	0.922	-0.17
TLL	115.8919	6.34115	71.3243	21.25644	0.985	0.003
Phil	114.3429	3.47210	75.4000	17.20841	0.000	0.986
Geo	116.6154	5.77479	69.6056	20.60360	0.371	-0.147

Conclusions

This study examined the relationship between reading comprehension self-efficacy and scientific literacy among final-year students enrolled in different social science disciplines. The findings provide a more comprehensive understanding of how these two constructs interact and, more importantly, where they diverge across disciplinary contexts.

The findings clearly demonstrate that although reading comprehension is an essential component of academic achievement, it is not sufficient by itself to ensure scientific literacy. While students generally perceived themselves as competent readers, their performance on the scientific literacy assessment revealed considerable weaknesses, particularly in higher-order cognitive processes such as evidence-based reasoning, critical evaluation, synthesis, and scientific explanation. This discrepancy highlights an important gap between perceived reading competence and actual performance in cognitively demanding scientific tasks.

Considering the university admission process, where students are expected to possess relatively high reading and comprehension abilities, these findings are particularly noteworthy. Although students entered higher education with adequate reading skills, these abilities did not translate into competencies required for interpreting scientific texts, evaluating evidence, constructing scientific explanations, or applying scientific reasoning. This finding supports recent evidence demonstrating that reading comprehension alone cannot fully explain scientific literacy, as cognitive skills also play an equally important role (Sun et al., 2025).

The present findings are consistent with the broader literature suggesting that scientific literacy extends well beyond reading proficiency. Harlen (1999) argues that scientifically literate individuals should question information, evaluate evidence, collect facts, and develop reasoned interpretations. Extending this perspective, Bossér (2024) emphasizes that scientific literacy should be viewed as the capacity to engage in authentic scientific practices, critically evaluate evidence, and apply scientific knowledge to real-world contexts rather than merely acquiring scientific information. Furthermore, Kumar and Choudhary (2025) argue that scientific literacy should be reimagined as a future-oriented competency framework that enables learners to solve real-world problems, make informed decisions, and engage with complex scientific and societal issues. Building on this perspective, Roy et al. (2025) argue that scientific literacy develops through intentionally designed learning experiences that integrate inquiry, reasoning, and discussion. Consistent with these perspectives, the present study indicates that many undergraduate students, despite reporting high levels of reading comprehension self-efficacy, do not sufficiently employ scientific reasoning processes when interpreting information or evaluating scientific evidence.

This limitation became evident in several aspects of the scientific literacy assessment. A considerable proportion of students failed to support their responses with scientific evidence, experienced difficulty in designing and planning scientific investigations, and demonstrated weaknesses in evidence searching and text-based scientific reasoning. Likewise, Lonsbury and Ellis (2002) argue that understanding how scientific knowledge is generated and revised enables individuals to make more informed scientific decisions. The current findings suggest that these competencies remain underdeveloped among many social science students.

One of the major contributions of this study is demonstrating that the relationship between reading comprehension and scientific literacy is not uniform across academic disciplines. Strong and statistically significant relationships were identified in the Information and Document Management and Philosophy departments, suggesting that analytical and structured reading practices may facilitate scientific reasoning. In contrast, no significant relationship was found in Turkish Language and Literature, Geography, and Islamic Studies, indicating that reading proficiency alone does not automatically develop students' ability to interpret, evaluate, and utilize scientific information. These findings further highlight the importance of disciplinary epistemologies and cognitive training in shaping scientific literacy.

Taken together, these findings support a conceptual distinction between basic reading competence and scientific literacy. Self-perceived reading ability and basic comprehension appear insufficient for developing scientific literacy unless accompanied by higher-order cognitive abilities such as critical inquiry, argument evaluation, evidence-based reasoning, and scientific problem solving. Scientific literacy should therefore be understood as a more advanced cognitive construct that extends beyond reading to include questioning, interpreting, evaluating, and applying knowledge within scientific contexts.

From a practical perspective, the findings underscore the need for a more integrated and interdisciplinary approach to higher education curricula. Developing scientific literacy among social science students requires more than strengthening reading skills; it requires explicit instruction in critical thinking, scientific reasoning,

evidence evaluation, and inquiry-based learning. Integrating socio-scientific issues into teaching through interdisciplinary approaches may strengthen students' scientific reasoning and scientific literacy (Fujinami et al., 2025). Likewise, incorporating socio-scientific image-texts into classroom instruction may improve students' ability to critically evaluate scientific information in authentic contexts (Pun et al., 2025).

These findings also have important implications for educational policy. The results suggest that universities and educational authorities should reconsider curriculum design to ensure that scientific reasoning skills are explicitly taught rather than assumed to develop through reading activities alone. In particular, incorporating elective natural science courses, interdisciplinary learning experiences, and inquiry-oriented instruction into social science programs may contribute substantially to improving students' scientific literacy.

Nevertheless, these findings should be interpreted with caution. The exceptionally high correlation coefficients observed in some departments may reflect sample-specific characteristics or partial overlap between the measurement instruments. Furthermore, the study was conducted at a single university with a specific population of final-year students, limiting the generalizability of the findings. The use of a self-report measure for reading comprehension may also have introduced response bias.

In conclusion, this research demonstrates that fostering scientifically literate individuals requires moving beyond viewing reading as an end in itself. Reading should instead be regarded as a necessary but insufficient foundation within a broader cognitive framework that also includes scientific reasoning, critical evaluation, evidence-based thinking, and inquiry. Future studies should further investigate how discipline-specific pedagogical approaches can more effectively integrate reading comprehension with scientific reasoning and scientific literacy development.

Declarations

Ethics and Consent to Participate: The research reported in this human subjects research study was overseen and approved by the Institutional Review Board of the University of Çankırı Karatekin University. All participants were informed about the purpose of the study and their rights, and informed consent was obtained prior to participation. Participation was voluntary and anonymity/confidentiality was assured.

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Conflict of Interest: The authors declare that they have no conflict interests.

Data availability: Upon reasonable request, the scale data will be shared as an Excel document, and the graded science exam papers will be shared as photographs.

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