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Open Book Exams in Higher Education: A Systematic Review

Abstract

Introduction. The traditional exam system is in crisis as it focuses on rote memorization and high loads, which increase student anxiety and reduce the level of practical training. In response to these challenges, more attention is being paid to innovative assessment formats, such as open-book exams (OBE), aimed at developing critical thinking, self-regulated learning, and deep understanding of the material. *Methodology and Methods*. A systematic review analyzed 20 studies published between 1950 and 2025, involving 3,349 participants from 11 countries. The studies were conducted in accordance with PRISMA guidelines. Databases such as PubMed, Web of Science, and Scopus were used, along with citation and reference analysis to identify relevant publications. Data were collected and synthesized thematically to identify key trends and effects of OBE implementation. *Results*. The review showed that OBEs significantly reduce student anxiety by focusing on understanding and applying knowledge rather than mere memorization. They promote critical thinking, self-learning skills, and deeper engagement with learning materials. However, the effectiveness of OBEs depends on proper question design, preparation strategies, and implementation. *Scientific Novelty*. This study represents the first systematic review covering data over a 75-year period and examining the impact of OBEs on educational outcomes, students' emotional state, and cognitive development. *Practical Significance*. The findings highlight the potential of OBEs as a tool for improving the quality of education and preparing students for professional activities, especially when implemented thoughtfully.

Keywords: examination, higher education, open-book, exam review, higher education review.

Introduction. The rapid transformation of the education system and the growing acceptance of non-formal education highlight the need for innovative teaching methods in higher education. Traditional approaches often fail to address diverse learner needs, foster personal growth, or promote lifelong learning. New methodical ways, such as tailored educational paths, inclusive tools, and goal-oriented strategies, are essential to expand access, enhance practical skills, and encourage continuous development. By integrating flexible models like the student-university-environment framework, universities can create motivating environments that unlock individual potential and adapt to modern societal demands (Suvorova et al., 2024).

Exams in modern higher education serve as a critical tool for assessing knowledge, promoting learning, and fostering skills like collaboration and critical thinking. Traditional individual exams emphasize mastery of content, while collaborative assessments encourage teamwork, communication, and problem-solving-essential skills for the modern workforce (Holmes & Lauwerys, 1969). Beyond measuring performance, exams shape instructional strategies, offering opportunities for feedback and reflection. However, their role is evolving, with growing emphasis on innovative formats like two-stage or open-book exams to align with real-world demands. Balancing assessment rigor with instructional time and addressing challenges like free-riding remain key considerations in optimizing exams for student success (Efu, 2019).

The traditional exam system is in crisis, as it heavily relies on rote memorization and high-stakes testing, which exacerbate student anxiety

and stress (Buckley, 2024). Many students feel unprepared for real-world challenges because the system prioritizes theoretical knowledge over practical application. This outdated approach often fails to foster critical thinking, creativity, and problem-solving skills, leaving learners disconnected from the demands of modern life(Jensen et al., 2014). Moreover, the pressure to perform in rigid, time-bound exams undermines holistic learning and mental well-being. As education evolves, there is an urgent need to shift toward more inclusive, skill-based, and practical assessment methods that nurture both personal growth and professional readiness while reducing unnecessary stress (Sato et al., 2019). The determination of new examination methods, such as e-exams, is driven by the need for innovation in higher education, supported by models like "Open Book", which emphasize optimizing implementation through teacher training, technology familiarity, and effective communication strategies, ensuring a theory-based, goal-oriented approach to transforming assessments while addressing challenges and leveraging existing institutional structures (Fink et al., 2023).

Materials and Methods. This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement guidelines (Page et al., 2021). The search was conducted in February 2025. Studies were included in the current systematic review if they were in accordance with the following criteria: 1) peer-reviewed; 2) used human subjects; 3) high-school, courses, online exams were excluded; 4) in the English language. As this is the first time such a review has been undertaken, all eligible studies before the search date were included. Three electronic databases were utilized for the systematic literature search: PubMed, Web of science and Scopus. The following search terms were included and combined using the operators "AND", "OR": ("open book") AND ("exam" OR "control" OR "examination"). Additionally, reference lists and citations (Google Scholar) of the identified studies were explored to detect further relevant studies.

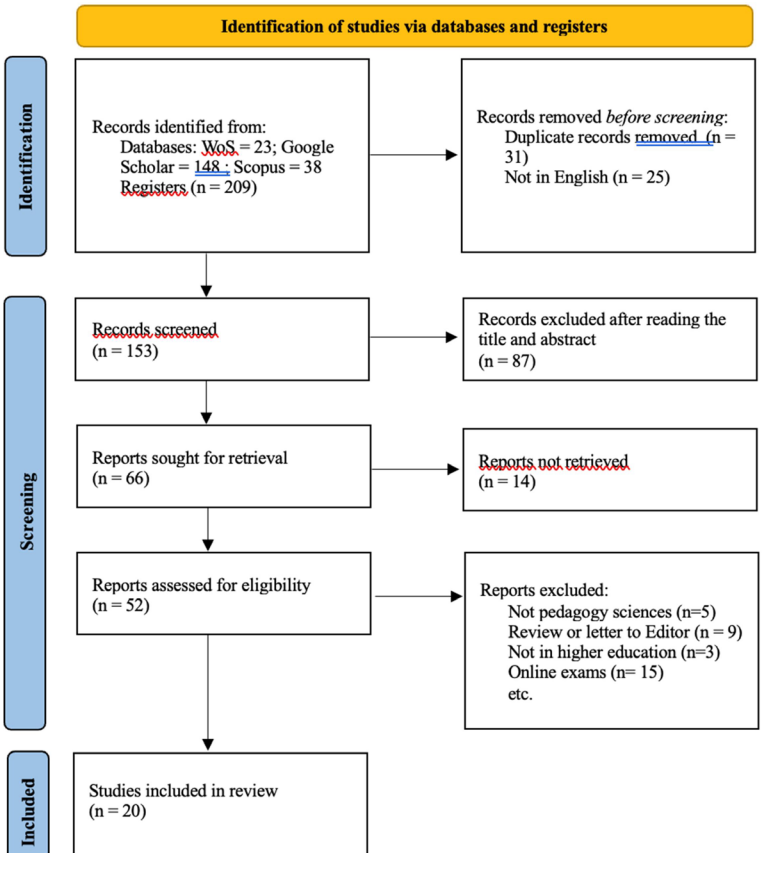

Figure 1: PRISMA flow chart of data extraction from the literature search

The final screening was based on the relevance of the inclusion and exclusion criteria and the identified items for assessing open-book exams in relation to higher education. If the title showed any potential relevance, the abstract was screened. When abstracts indicated potential inclusion, full-text articles were reviewed to determine the eligibility of the studies. Data were collected for all relevant experimental variables related to open-book examination, including observations, authorship, year, and country of study. The abstracts were then imputed into a bibliography software (Zotero) to remove duplicate studies, and then an abstract list was extracted to Microsoft Word. Wide-ranging protocols and measured outcomes and observations were used in the included studies. A thematic synthesis was undertaken, which systematically extracted, recorded and synthesized relevant data from each study (Thomas & Harden, 2008). Each study's variables and outcomes were recorded and coded on a Google Sheets spreadsheet by both psychological and climbing content to make connections between individual studies around relevant descriptive and then analytical themes.

Results. Of the 209 records identified after duplicates and non-English studies were removed, 153 were screened in full text for eligibility. Of these 52, 26 were excluded. Reasons for exclusion are listed in Figure 1. After screening, 25 studies were included. Study characteristics can be seen in Tables 1. All of the studies used quantitative methods and one used qualitative method. The studies were conducted in 11 countries and published between 1950 and 2025. Total Participants: 3349 individuals across all studies. Participants ranged from 8 to 50 years. Countries Involved: UK, USA, Iraq, Australia, Belgium, South Africa, Malaysia, Pakistan, Cyprus, Netherlands, Germany. Many studies examined whether open-book exams led to better scores compared to closed-book exams. Results were mixed-some found improved performance, while others reported no significant difference. Few studies found that open-book exams enhanced long-term retention; most showed no significant impact.

Table 1. *Characteristics of studies examining open-book examination in higher education*

Study/ year / country	Participants	Task or intervention	Outcomes
Dlzar Sedeeq Anwer et.al. / 2020 / Iraq (Abdulmajeed Mamhusseini, 2020)	100 nursing students and 35 teaching staff from the College of Nursing at Hawler Medical University	Allow students to use notes, textbooks, and other approved materials during exams.	Reduction in Test Anxiety: Both students (60%) and teachers (51.4%) agreed that OBEs reduce students' test anxiety, aligning with findings from studies conducted in Hong Kong and Singapore. Promotion of Critical Thinking: A significant proportion of students (41%) and teachers (48.6%) strongly agreed that OBEs encourage critical thinking about course content. Encouragement of Self-Directed Learning: Most participants (students: 42%; teachers: 40%) believed that OBEs foster self-directed learning by promoting deep learning and critical thinking. Decrease in Memorization: Both groups (students: 49%; teachers: 54.3%) agreed that OBEs reduce the need for rote memorization, encouraging students to focus on understanding concepts rather than recalling facts. Enhanced Engagement with Textbooks: Teachers (60%) and students (48%) strongly agreed that OBEs motivate students to read textbooks and articles more frequently and deeply. Preparation Time:

			While students (46%) strongly agreed that OBEs require less preparation time, teachers (28.6%) moderately agreed with this statement. This finding contrasts with a Finnish study where students reported spending similar amounts of time preparing for OBEs and traditional exams. Preference Over Closed-Book Exams: A majority of students (40% strongly, 40% moderately) preferred OBEs over closed-book exams, while teachers were slightly less enthusiastic (31.4% moderately, 31.4% somewhat).
David Boniface / 1985 / USA (Boniface, 1985)	30 volunteer candidates from a second-year psychology course at Hatfield Polytechnic	Candidates were allowed to bring handwritten notes and textbooks into a three-hour open-book examination.	Reduction in Test Anxiety: Both students (60%) and teachers (51.4%) agreed that OBEs reduce students' test anxiety, aligning with findings from studies conducted in Hong Kong and Singapore. Promotion of Critical Thinking: A significant proportion of students (41%) and teachers (48.6%) strongly agreed that OBEs encourage critical thinking about course content. Encouragement of Self-Directed Learning: Most participants (students: 42%; teachers: 40%) believed that OBEs foster self-directed learning by promoting deep learning and critical thinking. Decrease in Memorization: Both groups (students: 49%; teachers: 54.3%) agreed that OBEs reduce the need for rote memorization, encouraging students to focus on understanding concepts rather than recalling facts. Enhanced Engagement with Textbooks: Teachers (60%) and students (48%) strongly agreed that OBEs motivate students to read textbooks and articles more frequently and deeply. Preparation Time: While students (46%) strongly agreed that OBEs require less preparation time, teachers (28.6%) moderately agreed with this statement. This finding contrasts with a Finnish study where students reported spending similar amounts of time preparing for OBEs and traditional exams. Preference Over Closed-Book Exams: A majority of students (40% strongly, 40% moderately) preferred OBEs over closed-book exams, while teachers were slightly less enthusiastic (31.4% moderately, 31.4% somewhat).
Richard Brightwell et.al. / 2004 / UK (Brightwell et al., 2004)	First-semester Bachelor of Science students (N = 196) at Edith Cowan University	Students completed an online multiple-choice test twice-once in a closed-book setting and once in an open-book setting. The test included questions	Students generally perceive open-book exams as less stressful and more conducive to higher-order thinking. Educators view open-book exams as promoting critical thinking rather than rote memorization. Despite these perceptions, the study found no significant difference in mean scores between the two formats (closed-book mean = 55%, open-book mean = 57%; $p > 0.05$). Many students did not adequately prepare for the open-book exam, which may explain why their scores did not improve significantly.

		aligned with Bloom's Taxonomy levels 2 (comprehension) and 3 (application).	Weaker students showed a slight (non-significant) improvement in open-book conditions, suggesting that such exams might benefit lower-performing students. Time spent on the exam (>60 minutes) did not correlate with better performance, indicating that extended time may not be advantageous.
Cnop I. et.al. / 1992 / Belgium (Cnop* & Grandsard, 1994)	Freshmen pharmacy students at a Dutch-speaking university in Brussels, who are motivated but lack strong mathematical preparation.	The study introduces an open-book exam format where students are allowed to bring course texts, books, and personal notes during the theoretical oral exam.	Traditional exams testing memorization skills The authors highlight that traditional exams fail to assess higher-level mathematical skills or the ability to synthesize knowledge. The open-book exam addresses this by testing students' ability to locate, explain, and apply concepts from their notes and textbooks. Reduced stress, improved skills in synthesis and reasoning The open-book format reduced stress for students and encouraged them to develop skills such as synthesis, reasoning, and application. However, some students still relied heavily on rote learning, indicating a need for further adaptation to this new format. Deeper engagement with material, promotion of lifelong learning, preparation for real-world applications
H du Preez et. al. / 2012 / South Africa (du Preez & du Preez, 2012)	The participants were 10 B Com Accounting (Honours) students at the University of Pretoria, South Africa, selected from a pool of 218 students enrolled in taxation courses.	The task involved conducting an IQA focus group to explore students' perceptions of open-book assessments before they experienced such exams. Participants were asked to share their thoughts, feelings, and expectations about open-book assessments.	Preparation as the Cornerstone Students viewed preparation as essential for success in open-book assessments. They emphasized understanding principles and organizing resources effectively. Familiarity with the layout of the Income Tax Act. Importance of forming a referencing habit. Avoiding over-reliance on textbooks during the exam. Resource Accessibility and Its Dual Impact While resources like the Income Tax Act were seen as beneficial, they also raised concerns about dependency and laziness. Reduced need for memorization, access to detailed information. Potential for incomplete answers and poor time management. Emotional and Cognitive Shifts Open-book assessments prompted a mental and emotional adjustment, requiring students to adopt new study and exam strategies. Increased optimism and motivation. Need for a different approach to studying and answering questions. Environmental and Personal Challenges Students anticipated challenges related to the exam environment and personal habits.
Deborah Erlich et.al. / 2017 / USA (Erlich, 2017)	Third-year medical students enrolled in the mandatory 6-week family medicine clerkship at Tufts University School of Medicine (N = 599 over three years)	A novel final exam consisting of two parts: Closed-Book Knowledge Assessment (KA): Traditional multiple-choice questions testing factual knowledge.	Feasibility Successful administration of the open-book exam to a large cohort of students, with minimal technical issues and high completion rates. Performance No significant difference in scores between the open-book and closed-book exams, suggesting that open-book exams are as rigorous as traditional formats. Correlation with Clinical Skills Strong alignment between open-book exam performance and preceptors' clinical ratings, particularly in domains like information mastery and self-directed learning.

		Open-Internet Information Mastery Assessment (IMA). Timed, case-based questions requiring students to use web resources to answer clinical questions, cite evidence, and provide strength-of-recommendation ratings.	Learning Experience Positive student feedback, reduced anxiety, and appreciation for the higher-order skills tested.
Afshin Gharib et.al. / 2012 / USA (Gharib et al., 2012)	297 students (64 males, 233 females) across eight sections.	Students were permitted to use all course materials (e.g., textbooks, notes) during the exam	The main outcomes related to open-book exams were analyzed under three categories: performance, retention, and anxiety. Performance Students scored significantly higher on open-book exams compared to closed-book exams in Introductory Psychology ($p< 0.05$). Retention There were no significant differences in retention quiz scores across exam types in either Introductory Psychology or Statistics ($p > 0.05$). Anxiety Test anxiety levels were significantly lower during open-book exams compared to cheat sheet exams in both Introductory Psychology ($p< 0.05$) and Statistics ($p< 0.05$).
Muhammad Fairuz Abdul Jalal et.al / 2013 / Malaysia (Jalal et al., 2014)	The study involved 396 undergraduate students from two psychology courses at a small liberal arts university	Students were subjected to three types of exams: open-book, cheat sheet, and closed-book. These exam types were counterbalanced across sections to ensure fairness.	Performance Students scored higher on open-book exams compared to closed-book exams in Introductory Psychology (mean score: 80.11 vs. 72.52, $p< 0.05$). In Statistics, there was no significant difference between open-book and cheat sheet exam scores. Retention No significant differences were found in retention quiz scores across exam types, suggesting that open-book exams do not necessarily enhance long-term retention. Anxiety Test anxiety was significantly lower during open-book exams compared to cheat sheet exams in both courses ($p< 0.05$). Preferences Students overwhelmingly preferred open-book exams over closed-book exams, perceiving them as less stressful and more conducive to better performance.
Tariq Javed et. al. / 2020 / Pakistan (Javed & Choudhary, 2020)	The participants were 54 students in Grade IX from a Fede-	The open-book exam group was allowed to use notes, textbooks, and	Academic Achievement Through Open-Book Exams The open-book exam group demonstrated better comprehension and application of concepts compared to the closed-book group.

	ral Government Public School in Rawalpindi	other helping materials during formative assessments over a four-week period. In contrast, the closed-book exam group followed traditional assessment methods without access to external materials.	Statistical analysis (t-test) showed that the difference in performance between the two groups was significant, supporting the effectiveness of open-book exams for struggling learners. The unrestricted approach of open-book exams helped learners focus on understanding rather than rote memorization. Open-Book Examination as a Motivational Tool Students in the open-book exam group reported reduced exam anxiety and increased intrinsic motivation. The mean score of the open-book exam group (32.55) was higher than that of the closed-book exam group (30.18), indicating better academic performance. Open-book exams encouraged self-directed learning and promoted critical thinking among struggling learners. Challenges and Benefits of Open-Book Exams Reduced reliance on rote learning. Encouraged active engagement with content and materials. Promoted higher-order thinking skills like analysis, synthesis, and evaluation.
Richard A. Kalish / 1958 / USA (Kalish, 1958)	158 students (85% women, 75% sophomores) in two sections of a child psychology course, replicated with 161 students.	Two mid-term exams-one closed-book, one open-book-administered under controlled conditions.	No significant reduction in errors with open-book exams. There was no significant difference in total errors between open-book and closed-book exams. Statistical analysis showed that the opportunity to use materials did not reduce errors, suggesting that access to resources did not enhance accuracy. Open-book exams measure different abilities than closed-book exams. Open-book exams measured different abilities than closed-book exams, as evidenced by significantly lower correlations between scores on the two types of exams (r = .495 and .460 vs. r = .691 and .579). This indicates that open-book exams assess skills like practical reasoning and application, while closed-book exams emphasize memory and recall. No correlation between students' perceived help from open-book exams and their scores. Students' self-reported ratings of how helpful they found the open-book format («Much,» «Some,» «Little,» «No») were not correlated with their performance. For example, students who rated the open-book exam as «Little help» performed similarly to those who rated it as «Much help.»
Mary Koutselini Ioannidou / 1997 / Cyprus (Koutselini Ioannidou, 1997)	The participants were 72 sophomore and junior students from the University of Cyprus enrolled in a course on «Theory and	Students were encouraged to use textbooks and notes during the course as aids for discussion and critical thinking.	Achievement Scores: No statistically significant difference in total scores between the open-book and closed-book groups. Closed-book students performed better in sections requiring definitions/terminology understanding and problem-solving. Open-book students showed slightly better performance in the argumentation section, though this difference was not statistically significant. Behavioral Observations: Students who spent more than 50% of their time consulting books scored lower overall.

	Teaching Methodology.» Control Group (n=39): Closed-book examination setting. Experimental Group (n=33): Open-book examination setting.		A strong positive correlation was found between writing time and total score, while consulting books negatively correlated with performance. Qualitative Insights: Some students relied excessively on reference materials, treating them as substitutes for their own thinking. Closed-book students appeared to prepare more thoroughly due to the perceived difficulty of the exam.
Daniel T. Malone et. al. / 2021 / Australia (Malone et al., 2021)	Final-year Bachelor of Pharmacy students at Monash University, Australia.	Allowing students to use the AMH (a medicines formulary) during end-of-semester examinations in the second semester, compared to closed-book examinations in the first semester.	Performance No significant difference in examination marks between closed-book and open-book formats. Open-book examinations featured a higher proportion of cognitively demanding questions without negatively impacting performance. Study Behaviors Students spent more time studying with the AMH during the second semester. Self-reported study hours remained consistent across semesters, suggesting no reduction in effort despite the availability of the AMH. Perceptions Students preferred open-book examinations, citing reduced anxiety and enhanced focus on higher-order thinking skills. Concerns were raised about the potential for over-reliance on the AMH and its impact on demonstrating individual knowledge. Alignment with Real-World Practice Open-book examinations were viewed as more relevant to real-world pharmacy practice, where practitioners frequently consult resources like the AMH.
Srinivasan Ramamurthy et.al. / 2016 / Malaysia (Ramamurthy et al., 2016)	The participants were undergraduate pharmacy students enrolled in a Bachelor of Pharmacy program at the International Medical University (IMU), Malaysia. Year 1 Students: 71 students (12 males, 59 females).	The intervention involved administering two types of formative examinations: Open-Book (OB) Examination: Students were allowed to use textbooks, online resources, or personal notes during the test. Closed-Book (CB) Examination: Students were not	Performance, Perception, and Learning Approach Students performed significantly better in OB examinations (mean score = 57.4) compared to CB examinations (mean score = 50.5), with a medium effect size (Cohen's d = 0.36, p = 0.003). Year 2 students showed slightly higher scores than Year 1 students in both OB and CB formats, likely due to their familiarity with OB exams. Deep Information Processing (DIP) Scores No significant difference was found in DIP scores between OB and CB formats for either cohort, indicating that the type of exam did not influence the depth of learning. However, Year 2 students scored slightly higher in critical reading and structuring dimensions, possibly due to their greater experience and confidence.

	Year 2 Students: 65 students (12 males, 53 females).	permitted to refer to any external materials during the test.	
Gregory Samsa / 2021 / UK (Samsa, 2021)	The participants include students enrolled in a Master's of Biostatistics program at Duke University Medical Center.	The intervention was the redesign of the QE into an open-book, collaborative, take-home format. This new format allowed students a week to complete the exam, encouraged collaboration with peers and instructors, and focused on integrating first-year course material into applied settings.	Student Feedback and Perceptions of Open-Book Exams Students generally viewed the QE positively, rating it 79 out of 100 on average. Key positive aspects included: Collaboration helped build confidence and provided different perspectives. The exam mirrored real-world tasks, preparing them for post-graduation expectations. Questions required critical thinking and integration of concepts across courses. Educational Goals and Fairness in Open-Book Examinations Educational Process Fairness: Enabled students to perform to their potential regardless of background. Cultural and Linguistic Fairness: Sensitive to students' social, cultural, and linguistic diversity. Goal Fairness: Focused on skills relevant to students' future careers rather than rote memorization. Evolution Toward an Open-Book Examination Format The outcomes included improved alignment between the QE and the program's educational goals, reduced stress for students, enhanced opportunities for learning during the exam process, and better preparation for real-world biostatistical practice. Students reported that the new format felt practical and less like a traditional exam.
Olesya Senkova et. al. / 2018 / USA (Senkova et al., 2018)	The study involved undergraduate students enrolled in introductory psychology courses at a public university in the Midwestern United States (136 females vs. 39 males).	Participants studied Swahili-English word pairs and were subjected to either open-book or closed-book quizzes during the initial testing phase. The open-book condition allowed participants to refer to the study list while answering quiz questions, whereas the closed-book condition required reliance on memory.	Similar Performance Across Formats Open-book and closed-book formats yielded comparable results on the final test, suggesting that both formats effectively promote long-term retention. Testing Effect Prevails The act of being quizzed, regardless of format, enhanced long-term retention compared to re-studying. Potential Advantage of Closed-Book Cued Recall While open-book tests were not inferior, closed-book cued recall showed a slight advantage in promoting deeper processing and higher final test performance for correctly recalled items. Implications for Online Learning Open-book tests are particularly useful in online classes where preventing cheating during closed-book tests is difficult.

Tali Spiegel et. al. / 2023 / Netherlands (Spiegel & Nivette, 2023)	Bachelor-level students: Upper-level course, including international exchange students in 2019 but not in 2020 due to COVID-19 restrictions (150 students) Master-level students: Enrolled in a one-year master's program, with some students from other programs (60 students)	Two types of examination: In-Class Closed-Book Examination and Take-Home Open-Book Examination (Conducted remotely, allowing students access to course materials).	Academic Performance and Knowledge Retention No significant differences were found in examination grades between ICE and THE cohorts for either bachelor or master students. However, bachelor students in the THE cohort reported significantly lower overall course grades, potentially due to reduced performance on additional assignments. Wellbeing and Stress Bachelor students in the THE cohort reported significantly lower wellbeing compared to their ICE peers, contrary to expectations that open-book exams reduce stress. Master students showed no significant differences in wellbeing between the two examination formats. Cheating and Academic Integrity Concerns about cheating were raised, particularly regarding collaboration and help-seeking behaviors during THEs. Plagiarism cases were identified and addressed, but other forms of cheating (e.g., unauthorized collaboration) may have gone undetected. Strict time limits and plagiarism detection tools partially mitigated these risks.
Markus Spitzer/ 2025 / Germany (Spitzer et al., 2025)	Two cohorts were compared: Open-Book Group (2021): 112 students who took an online open-book examination. Closed-Book Group (2022): 83 students who took an in-person closed-book examination.	The intervention involved administering two different examination formats: Open-Book Examination (2021): Students could use supplementary materials such as textbooks, notes, and digital resources during the exam. The exam was conducted online via the ILIAS platform, with no proctoring or monitoring of resource usage. Closed-Book Examination (2022): Students were not allowed to use	Higher Examination Accuracy: Students in the open-book group achieved significantly higher average examination accuracy (mean = 69.09%) compared to the closed-book group (mean = 64.26%). This difference was particularly pronounced for lower-performing students, who benefited more from the open-book format than higher-performing students. Increased Pass Rates: A higher proportion of students passed the open-book examination (89%) compared to the closed-book examination (78%). Longer Examination Duration: Students in the open-book group spent more time on the exam (mean = 49.79 minutes) compared to the closed-book group (mean = 40.06 minutes), likely due to the use of supplementary materials. No Differential Item Functioning: The benefits of the open-book format were consistent across all question items, regardless of difficulty level. Selective Effects for Lower-Performing Students: Lower-performing students (first quartile) showed greater improvement in examination accuracy in the open-book format compared to higher-performing students (fourth quartile).

		any external resources and completed the exam in a controlled university setting using standardized computers.	
Christos Theophilides / 1996 / Cyprus (Theophilides & Dionysiou, 1996)	The study involved all sophomore students (N = 173) enrolled in an introductory education course at a university's teacher-education program.	Students participated in an open-book examination as part of their course assessment. This exam allowed them to use course textbooks, notes, and other prepared materials during the test.	Creative Knowledge Application Students demonstrated critical thinking and deep problem analysis Developed original answers rather than recalling memorized information Transferred knowledge to new situations effectively Course Content Mastery Students engaged in comprehensive study techniques Compared and contrasted information from multiple sources Integrated knowledge across different course topics Self-Evaluation and Feedback Students identified learning gaps during preparation Conducted post-exam self-assessment of performance Adjusted study approaches based on self-evaluation Stress Reduction Exam anxiety significantly decreased Students approached exams more optimistically Worked through answers in a relaxed manner Self-Regulated Learning Students actively monitored their study progress Identified weaknesses in understanding Emphasized gathering and synthesizing information
Christos Theophilides / 2000 / Cyprus (Theophilides & Koutselini, 2000)	The participants were 276 education majors enrolled in an introductory course on instructional theory and practice at the University of Cyprus	The intervention involved exposing students to both closed-book and open-book examination formats during the same course. Specifically: Closed-Book Examination: Students were required to recall information without access to external materials. Open-Book Examination: Students were	Course-Content Mastering Behavior Students preparing for open-book exams engaged in deeper learning, interrelating information and reconstructing course content meaningfully. Closed-book preparation focused on memorization and surface-level study. Involvement in the Learning Process Open-book preparation encouraged consistent study throughout the semester, while closed-book preparation often led to last-minute cramming. Creative Use of the Course-Acquired Information During open-book exams, students applied critical thinking, analyzed and synthesized information, and presented personal views creatively. Closed-book exams limited creativity, focusing on recall-based answers. Optimism for the Exam Outcome Students approached open-book exams with greater confidence and optimism, reducing stress and anxiety compared to closed-book exams.

		allowed to consult textbooks, notes, and other course materials during the exam.	
Jacob Verduin/ 1950 / USA (Verduin, 1950)	College freshmen enrolled in plant science courses at the University of South Dakota. The study involved 186 students over four semesters.	Students were allowed to use textbooks and reference materials during exams.	Shift Away from Memorization Closed-book exams emphasize rote memorization, which limits students' ability to apply knowledge practically. Open-book exams reduce reliance on memory and encourage students to focus on understanding concepts and utilizing resources effectively. Enhanced Learning Engagement Above-average students embraced the opportunity for broader study, motivated by the need to consult multiple sources. Below-average students initially preferred closed-book exams, believing they could achieve better grades through memorization. Improved Assessment Accuracy Open-book objective tests provided accurate grading comparable to traditional «lab practical» exams. The combination of open-book testing and objective design resulted in a fair evaluation of student abilities. Development of Critical Skills Students developed skills such as locating information, interpreting diagrams, and analyzing experimental data. Thought problems fostered critical thinking and collaborative learning. Attitudinal Changes Toward Education Students began viewing education as a process of skill development rather than mere knowledge acquisition. The abandonment of lectures helped shift the focus from «answers» to the process of finding answers.

Discussion. Across multiple studies, open-book exams are consistently reported to reduce test anxiety by shifting the focus from rote memorization to understanding and application. For instance, Dlzar Sedeeq Anwer et al. (2020) found that both students (60%) and teachers (51.4%) agreed that OBEs alleviate stress, aligning with similar findings from Hong Kong and Singapore. This sentiment is echoed in studies by Afshin Gharib et al. (2012) and Muhammad Fairuz Abdul Jalal et al. (2013), which demonstrated statistically significant reductions in anxiety during OBEs compared to closed-book or cheat sheet exams. Christos Theophilides (1996, 2000) further highlighted that students approached OBEs more optimistically and worked through answers in a relaxed manner, attributing this to reduced reliance on memory. Similarly, Gregory Samsa (2020) noted that the collaborative, take-home format of OBEs mirrored real-world tasks, reducing stress and enhancing confidence. However, Tali Spiegel et al. (2023) presented a contrasting perspective, finding that bachelor students in a take-home OBE cohort reported lower wellbeing despite the open-book format, suggesting that contextual factors like workload or pressure from additional assignments may offset the anxiety-reducing benefits. Overall, while most studies agree that OBEs reduce test anxiety, their effectiveness depends on how they are implemented and the broader educational context.

Open-book exams are consistently reported to promote critical thinking and higher-order skills such as analysis, synthesis, and application. For instance, Dlzar Sedeeq Anwer et al. (2020) found that a significant proportion of students (41%) and teachers (48.6%) strongly agreed that OBEs encourage critical thinking, while Cnop I. et al. (1992) highlighted that OBEs reduce reliance on rote memorization and instead foster skills like reasoning and synthesis. Similarly, Richard Brightwell et al. (2004) noted that students perceive OBEs as conducive to higher-order thinking, particularly at Bloom's Taxonomy levels 2 (comprehension) and 3 (application). Christos Theophilides (1996, 2000) further emphasized that students preparing for OBEs engaged in deeper learning, interrelating information and creatively applying knowledge during exams. However, some studies, like Mary Koutselini loannidou (1997), caution that over-reliance on reference materials can hinder independent thinking, and Richard Brightwell et al. found no significant performance differences between OBEs and closed-book exams, suggesting that outcomes depend on preparation and question design. Overall, while most studies agree that OBEs promote critical thinking, their success hinges on how effectively students adapt to the format and how well exams are designed to assess higher-order skills.

Christos Theophilides (1996, 2000) highlighted that students preparing for OBEs engaged in comprehensive study techniques, comparing information from multiple sources and integrating knowledge across topics. H du Preez et al. (2012) further emphasized that students viewed preparation as essential for success in OBEs, focusing on understanding principles and organizing resources effectively. However, some studies, such as Mary Koutselini loannidou (1997), noted that over-reliance on materials could hinder independent thinking, as students who spent excessive time consulting books during exams often scored lower. Dlzar Sedeeq Anwer et al. (2020) found that both teachers (60%) and students (48%) strongly agreed that OBEs motivate students to read and interact with course materials more deeply. Despite this, the consensus is that OBEs encourage deeper engagement with materials, fostering skills like synthesis, reasoning, and application, which are critical for real-world problem-solving. Most studies agree that OBEs promote active interaction with learning resources, shifting the focus from rote memorization to meaningful engagement with content. While challenges like over-reliance on materials and variability in preparation exist, the overall impact of OBEs is positive, particularly in encouraging students to develop self-directed learning habits and higher-order thinking skills. When implemented thoughtfully, OBEs can be a powerful tool for fostering deeper engagement with course materials and preparing students for practical applications beyond the classroom.

The theme of Self-Directed Learning and Preparation Strategies is consistently supported across multiple studies, with a strong consensus that open-book exams (OBEs) foster self-directed learning by encouraging students to take ownership of their learning process. For example, Dlzar Sedeeq Anwer et al. (2020) found that a significant proportion of students (42%) and teachers (40%) believed OBEs promote deep learning and critical thinking, while H du Preez et al. (2012) emphasized the importance of preparation strategies, such as organizing materials and understanding principles, for success in OBEs. Similarly, Christos Theophilides (1996, 2000) highlighted that students preparing for OBEs engaged in comprehensive study techniques, integrating knowledge from multiple sources and applying critical thinking during exams. However, some studies, such as Richard Brightwell et al. (2004), noted that many students did not adequately prepare for OBEs, which limited their effectiveness. This underscores the variability in engagement and preparation strategies, suggesting that while OBEs encourage self-directed learning, their success depends on how well students adapt to the format and utilize resources effectively. Most studies agree that OBEs promote self-directed learning by shifting the focus from rote memorization to understanding and application, but challenges like inadequate preparation and over-reliance

on materials highlight the need for guidance. When implemented thoughtfully, OBEs can help students develop essential skills such as resource organization, critical thinking, and lifelong learning habits. These exams also align with real-world applications, as noted by Gregory Samsa (2020), where collaboration and integration of knowledge mirror professional expectations. Overall, OBEs are a valuable tool for fostering self-directed learning, provided students are equipped with effective preparation strategies and clear expectations.

Conclusion. The systematic review of open-book exams (OBEs) in higher education reveals significant insights into their effectiveness, challenges, and implications for teaching and learning. Across multiple studies, OBEs consistently demonstrate a reduction in test anxiety by shifting the focus from rote memorization to understanding and application. This aligns with findings that students and educators perceive OBEs as less stressful and more conducive to fostering critical thinking and higher-order skills such as analysis, synthesis, and evaluation. For instance, studies like those by Dlzar Sedeeq Anwer et al. (2020) and Afshin Gharib et al. (2012) highlight statistically significant reductions in anxiety during OBEs compared to closed-book formats. However, the effectiveness of OBEs in reducing stress depends on contextual factors, including workload and additional assignment pressures, as noted by Tali Spiegel et al. (2023). Thus, while OBEs generally alleviate anxiety, their implementation must consider broader educational contexts.

Promoting critical thinking and higher-order cognitive skills is another key advantage of OBEs. Studies indicate that OBEs encourage deeper engagement with course materials, fostering skills like synthesis, reasoning, and problem-solving. Christos Theophilides (1996, 2000) emphasized that students preparing for OBEs engaged in comprehensive study techniques, integrating knowledge across topics and applying critical thinking during exams. Nevertheless, some studies caution against over-reliance on reference materials, which can hinder independent thinking. The variability in student preparation strategies underscores the need for clear guidance and expectations to maximize the benefits of OBEs. Enhanced engagement with learning materials and self-directed learning are also prominent themes. OBEs motivate students to interact deeply with course content, promoting lifelong learning habits. H du Preez et al. (2012) highlighted the importance of preparation strategies, such as organizing resources and understanding principles, for success in OBEs. However, inadequate preparation remains a challenge, as noted by Richard Brightwell et al. (2004), suggesting that the success of OBEs hinges on how well students adapt to the format.

In conclusion, OBEs offer significant potential to transform assessment practices in higher education by reducing anxiety, promoting critical thinking, and encouraging deeper engagement with learning materials. Their alignment with real-world applications makes them particularly relevant in modern education. However, challenges such as over-reliance on materials and variability in preparation strategies highlight the need for thoughtful implementation, clear guidelines, and ongoing support for both educators and students. When designed and executed effectively, OBEs can serve as a powerful tool to foster holistic development, equipping learners with essential skills for academic and professional success.

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