

**EXPLORING THE EVALUATIVE  
EFFICACY OF OPEN-BOOK OPEN WEB (OBOW)  
EXAMINATIONS: INSIGHTS FROM INDIAN  
UNDERGRADUATE DEGREE PROGRAMS**

Prriyam Agarwal  
Shaunak Roy

*Abstract*

*The higher educational paradigm in India has often been censured in academic and industrial circles alike, for its archaic academic practices, typified by an overemphasis on memory-based learning and examination structures. Consequently, a plethora of educated-yet-unemployable commerce and management graduates find it difficult to pursue productive and meaningful jobs (Mishra et al., 2014). The current study emphasizes on the 'examination system' as a fundamental facet of educational delivery, and aims to assess the efficacy of Open-Book-Open-Web (OBOW) as an alternative and more consequential mode of conducting examinations in the context of undergraduate commerce degree programs in India. The study attempts to answer the more pertinent question of whether such an unorthodox approach of conducting examinations would enable undergraduate-students to better cope with real-life challenges and situations. To fulfill these objectives, a descriptive, as well as an experimental research design, was employed. Phase-I of the study witnessed several undergraduate commerce as well as management students, professors, and working professionals in India participating in an extensive survey, which sought to probe into their perceptions and attitudes towards the conduct of the OBOW examinations, as opposed to the closed-book (CB) counterpart. The second phase (Phase-II) witnessed an examination conducted with two test groups – Test Group 1 (experimental group, appearing for OBOW examinations) and Test Group 2 (control group, appearing for CB examinations). Phase-I results indicated that respondents, in general, possessed a favorable attitude towards OBOW examinations, although they expressed skepticism about the feasibility of replacing archetypal CB exams with their OBOW variant. In the phase-II experiment, significant differences were observed among the students participating in the OBOW examination and those who took the Closed-book examination. Test Group 1 (experimental group) performed much better than the control group and seemed to have relatively lesser difficulty*

*in analyzing and interpreting the data. It may be concluded that closed-book examinations in their present form test memory and recall more than higher-order analytical skills and consequently, commerce students have been found to begin preparations for their examinations much later to ensure requisite recall. The efficacy of the constructivist OBOW paradigm lies in its ability to simulate real-world problems and situations.*

**Keywords:** open-book-open-web examinations; closed-book examinations; unemployable; memory-based learning; constructivist

## INTRODUCTORY OBSERVATIONS

The higher education scenario in India, especially in the context of undergraduate degree courses, has been perpetually obsessed with memory-based examinations, competitive examinations, and marks. However, the rising volumes of the 'educated-yet-unemployable' commerce and management graduates in the country raise a pressing need to embrace novel techniques of conducting student assessments by embracing the emerging digital transformation. The current techniques of the examination are predominantly of the closed-book type. Closed-book examinations are those where students are not allowed to refer to textbooks or classroom notes while writing. The questions typically asked on such examinations test if students can 'define', 'explain', 'provide reasons for' a particular concept or phenomenon, and have a fixed answer. Since the recall of information is incentivized in students, rote memorization is rampant. In this backdrop, the current study proposes the concept of introducing Open-Book-Open-Web (OBOW) examinations as a pioneering evaluation technique that enables students to appear for their examinations, while consulting the internet or other informational resources (Agarwal et al., 2007; Block, 2012; Feller, 1994). The questions asked in such examinations are 'unique', 'case-based' and do not necessarily have a fixed answer. This would mitigate their apprehension and apparent stress connected to examinations to a great extent as they can focus on preparing themselves more constructively, with longstanding scholarly upshots (Ioannidou, 1997; Theophilides & Koutselini, 2000). The current study primarily sought to determine if closed-

book (CB) examinations are effective enough to test real-world skills and aptitudes of commerce and management students beyond the realms of recall and rote-learning, and whether OBOW examinations are more effective in terms of simulating complex real-world challenges and situations. The study, additionally, through an experiment, sought to determine the divergences in the scores of students appearing for OBOW examinations and those appearing for closed-book examinations.

## **BACKGROUND LITERATURE**

### *Internet and Informational Impact*

Colley & Maltby, (2008) and Weisberg (2011) clearly evidenced that there has been exponential growth in knowledge that can be accessed via the internet and it has largely changed the way we access information. Wegner & Ward, (2013) and Ward (2013) explained that the internet is the most recent example of 'transactive memory'. This entails that society at large has outsourced information storage to the internet. Although outsourcing information storage was common in the pre-internet era as well, in the form of people storing information with their families, communities and in the form of photographs, the internet has provided such activities a 'supernormal stimulus', by not requiring people to remember where they stored the information. The internet is now being used as the 'external hard drive' of the world. Bell et al. (2015), observed that by storing factual information on the internet, much needed cognitive faculties may be freed for other endeavors. Heersmink (2016) approved of the same and stated the internet has already been useful for storing information for activities like academia, education, and journalism, among others.

### *Closed-Book Examinations*

Archetypal closed-book tests have been observed to be effective only to the extent wherein it indicates the student's ability based on what he has memorized (Feller, 1994). According to Sosbe (2005), the National Association of Communication Systems Engineers (NACSE) touted the closed book testing system 'archaic' and not

reflective of 'the real world'. Of late, the rationale for closed-book exams is being challenged the world over. Students tend to postpone studying for closed-book examinations to the end of the semester to ensure recall (Moore & Jenson, 2007). Williams (2006), had previously argued that closed-book examinations had become old-fashioned and had failed their purpose, since they encourage 'cramming' and 'data dumps' among students.

### *Open-Book Examinations*

An Open-book exam may be comprehended as one where students are bestowed the liberty of using resources such as textbooks and notes during the examination, but of course, they are not permitted to take the assistance of other students (Kalish, 1958). Williams & Wong (2009) rechristened this concept in a contemporary pedagogical and academic milieu as "Open-book, Open-Web" (OBOW) examinations. Open-book, open-web examinations have been observed to positively impact the development of higher-order thinking skills among students (Feldhusen, 1961; Feller, 1994; Kalish, 1958; Tussing, 1951). Open-book testing has been likened to the evaluation of high-level skills such as conceptualizing, problem-solving, and reasoning (Koutselini 1995; Theophilides, 1994). Further, OBOW is found to bear a significant impact on reducing the levels of stress for students (Francis, 1982; Boniface, 1985; Feller, 1994). Students tend to feel less anxious while studying for and writing open-book examinations (Ioannidou, 1997; Theophilides & Dionysiou, 1996). Apart from reducing anxiety, open-book examinations in a statistics course also augmented the level of enjoyment among students and encouraged deeper learning (Block, 2012). Further, open-book tests are perceived to mimic real-life situations where greater resources are available to solve the problem (Feller, 1994). Williams & Wong (2009) observed that an OBOW exam helps replicate a professional business environment, and is a vital validation for students who prefer such exams. They purported that it was an oddity for student to have to shut themselves in a room without computers to solve a problem in the real-world without talking to anyone. They argued that OBOW exams place the student in the position of a decision-maker. Vygotsky (1978) also advocated in favor of conducting role-plays, which help bridge the gap

between the learner and the professional. Open-book examinations have also been found to stimulate learning and the exam itself can be an arena for learning (Eilertsen & Valermo, 2000; Feldhusen, 1961; Koutselini 1995; Theophilides, 1994). Anecdotal evidence was given by Green et al. (2016), where accountancy students indicated that they learned more through OBOW testing irrespective of their grades, as they were free to master concepts rather than memorize technical details. Williams & Wong (2009) went on to demonstrate that if OBOW tests are longer than traditional closed-book exams, and are used as 24-hour assignments, they lead to more engagement among students. There have also been evidences to show that open-book examinations might trigger reduced levels of motivation to study. Since open-book exams are perceived as less “threatening”, they may lead to reduced preparation among students (Feldhusen, 1961; Boniface, 1985; Webber et al., 1983). Kalish (1958) noted that this may be due to a “false sense of security” that students have about the availability of reference materials. Damast (2007) highlighted the concerns about cheating and plagiarism with the evolution of testing approaches, although some of these issues had already been addressed previously in a study by Williams, (2006). Williams & Wong (2009) observed that to diminish instances of cheating, students must be instructed to submit OBOW answers or assignments via the electronic form to facilitate plagiarism checks. Moreover, test-taking time should be made “sufficiently tight” and each case-based question should be made “unique” and “highly contextualized”, to disincentivize cheating.

From another perspective, Doghonadze & Demir (2013), had interviewed teachers for their opinions on OBOW exams and noted that only those that have taken them before appreciate its usefulness. Concerns raised by the teachers included problems with designing the tests and a standardized system of evaluation for the answers. Boniface (1985) and Koutselini (1997) conducted an experiment and concurred that those students who expended more time writing the exam than consulting texts, had considerably better scores than those who did not. Agarwal et al. (2008) concluded that there were mixed-reports concerning long-term retention of the subject matter after an open-book examination. It must be noted in this context that OBOW tests may be more difficult to design

(Eilertsen & Valdermo, 2000). The teaching faculty might be insufficiently equipped in designing OBOW tests and they might also take a lot of time to prepare the same (Vanderburgh, 2005).

### *Student Performance in Closed-Book versus Open-Book Examinations*

Although there exist mixed opinions on the relative effectiveness of open-book exams, it must be observed that erstwhile research papers have perceived such exams from the viewpoint of varying objectives. In a study conducted by Michaels & Kieren (1973), they noted that open-book examinations do not necessarily lead to higher levels of accomplishment. Their test results showed that although the scores were higher for 'knowledge' and 'comprehension' questions, there was no significant difference in scores to 'application' questions. Ioannidou, (1997), Francis (1982), and Theophilides and Dionysiou (1996) reported similar results as well. Ackerman & Leiser (2014) also documented that student comprehension was higher when they used the open-book examination format.

Dimensions that were not well-thought-out in previous studies concerning open-book examinations encompass the limited compatibility between teaching and testing methods as students taught for closed book exams would be tested in an open-book setting. It has not been established if closed-book examinations are truly memory-based. Although there is a consensus to the affirmative, there has been little definitive research in this area to substantiate the assumptions. The previous studies also predate the ubiquity of the internet, which has changed the way we consume and treat information, academically and otherwise. There is a clear lack of research about the Indian context of the problem. Few studies on this topic have taken place in India and none have taken place in Kolkata.

### **METHODOLOGY**

As noted previously, the current study aims to assess the effectiveness of the Open-Book-Open-Web (OBOW) mode of

conducting examinations in the context of undergraduate commerce degree programs in India. To fulfill these objectives, a descriptive, as well as an experimental research design, was employed. Phase-I of the study employed a descriptive design that entailed the dissemination of a structured questionnaire to former and current undergraduate commerce and management students (total pool of 392 participants) and teaching faculty (total pool of 70 participants) in India. A structured questionnaire was disseminated to 407 student participants online, using judgement sampling technique. The goal was to probe into their perceptions and attitudes towards the conduct of the OBOW examinations, as opposed to the closed-book (CB) counterpart. The responses of 392 participants were finally shortlisted due to their completeness, resulting in a valid participation rate of 96.3 percent. All the teaching faculty contacted had responded and had participated in the survey. The profile of the student respondents has been outlined in Table 1. Students were based in the metropolitan setting of Kolkata.

**Table 1: Gender-wise Distribution of Students across Discipline**

Discipline of Students	Gender				Total	
	Male		Female		N	Percent
	N	Percent	N	Percent		
Commerce	109	0.52	102	0.48	211	0.54
Management	88	0.49	93	0.51	181	0.46
<b>Total</b>	<b>197</b>	<b>1.00</b>	<b>195</b>	<b>1.00</b>	<b>392</b>	<b>1.00</b>

Source: Authors' Calculations based on Field Data Collection

The other participants included faculty members from various higher educational institutions in Kolkata, and belonged categorically to the commerce and management disciplines. The profile of the teaching faculty members has been outlined in Table 2.

**Table 2: Experience-wise Distribution of Teaching Faculty across Departments**

Department	Teaching Experience										Total	
	< 3 years		3-5 years		6-10 years		11-20 years		> 20 years		N	%
	N	%	N	%	N	%	N	%	N	%		
Commerce	5	0.12	8	0.20	17	0.41	7	0.17	4	0.10	41	0.59
Management	4	0.14	7	0.24	10	0.34	5	0.17	3	0.10	29	0.41
<b>Total</b>	<b>9</b>	<b>0.26</b>	<b>15</b>	<b>0.44</b>	<b>27</b>	<b>0.76</b>	<b>12</b>	<b>0.34</b>	<b>7</b>	<b>0.20</b>	<b>70</b>	<b>1</b>

Source: Authors' Calculations based on Field Data Collection

The second phase (Phase-II) of the study adopted an experimental design, with 140 participants, clustered into two segments, namely, Test Group-I (an experimental group comprising of 70 undergraduate commerce and management students, appearing for OBOW examinations) and Test Group-II (control group comprising of 70 undergraduate commerce and management students, appearing for CB examinations). Upon completion of the test, the students were asked to fill out a feedback form to glean their preparation method and attitude towards the test. The study was conducted as well as evaluated under the supervision of four senior professors, over three months.

## **FINDINGS AND DISCUSSION**

The study was conducted in two phases, namely, Phase I and Phase II. The findings of the study have been discussed under the two segments separately.

### *Phase I*

Commerce (211 respondents) and management students (181 respondents) were asked to classify the subjects that they wrote examinations for into two types- theoretical and practical. Theoretical papers were defined as those for which 50 percent or more of the questions asked on final semester examinations could be found in class notes or textbooks. The analysis showed that 77.14 percent of the 35 subjects of the three-year course were theoretical in nature. This indicates that students are required to memorize information available in textbooks and classroom notes and reproduce them in examinations.

On the question of preparation for examinations well in advance, students recorded a mean score of 2.1. This suggests that students 'somewhat disagreed' preparing in advance for examinations, and delayed their preparation deliberately. This can be indicative of postponing preparations to ensure recall in the examinations. Students also agreed to rely on suggestions of teachers to prepare for examinations (Likert Mean 4.0). Moreover, students denied being



able to retain information from the course material after the examination was over, as shown by the Likert Mean of 2.63. This further strengthens the claim that students were studying in a manner to ensure short-term recall and not focus on long-term retention of the subject matter. Furthermore, since students agree that examination scores increase with retention levels, as suggested by a Likert mean of 4.34, it can be concluded that closed-book examinations are largely based on memory. It is noteworthy that while 205 students 'Strongly Agreed' to this statement, 138 'Somewhat Agreed', resulting in a total of 343 students out of 392 who expressed their agreement with this statement.

With a Likert Mean of 4.26, teachers agree that they tried to ensure retention of course material while teaching students. Hence, registering information to memory is considered to be an important aspect of the pedagogy of closed-book examinations. Moreover, students often complain of having to remember a lot of information for the exam (Likert mean of 3.8). Even teachers tend towards an agreement about retention being positively related to marks scored (Likert mean of 3.66).

All the subjects were found to rely most heavily on the internet for information while solving problems in the real-world (Likert Mean of 4.54). If undergraduate exams are to mirror real-life situations, then real-life sources of information should also be allowed during exams. However, this is not possible in closed-book exam settings as they are largely fact-based. Hence, the other viable alternative is to have OBOW exams. Analytical skills were placed higher than the memory in terms of employability (Likert Mean of 4.25) and analytical skills were lacking among graduates (Likert Mean of 4.13) as deemed by working professionals. This shows that the current evaluation structure may be hindering employability among undergraduates and working towards an alternative is warranted.

**Table 3: Effectiveness of OBOW Examinations as compared to CB Examinations**

Summary of Statements	Students	Teachers
College examinations help analyze real-world information	2.34	3.17
OBOW examinations questions will help analyze real-world information	3.90	4.03
OBOW examinations will reduce reliance on memory	4.11	4.17
OBOW examinations will reduce the usage of unfair means	4.09	3.94
OBOW examinations might be difficult to evaluate	3.51	3.40
OBOW examinations might reduce motivation to study	3.77	3.49
OBOW examinations will prepare students for their careers	3.84	4.14

*Source: Authors' Calculations based on Field Data Collection*

As shown in Table 3, students feel that closed-book examinations do not help analyze real-world information (Likert mean of 2.34), while teachers have a neutral stance on it (3.17). However, both students and teachers agree that OBOW examinations will help students in analyzing real-world information (3.90 and 4.03 respectively). This places OBOW examinations higher than their closed-book counterpart in terms of testing real-life information. Both students and teachers agree that OBOW examinations will help reduce reliance on memory to pass examinations (4.11 and 4.17 respectively). It has already shown that memory takes a backseat when compared to analytical skills. Hence, OBOW examinations score better on this metric as well. Both students and teachers agreed that OBOW exams will reduce the tendency of students to cheat on exams (4.09 and 3.94). It can be inferred that the definition of cheating has to change when OBOW examinations are concerned as information is freely available in such examinations. Both students and teachers have a Neutral stance on the difficulty to evaluate OBOW exams for examiners (3.51 and 3.4). Further research is warranted on the reasons for this. Students agree more strongly than teachers (3.77 as compared to 3.49) that they might not prepare well enough for an OBOW examination. This may be due to uncertainty and lack of instructions about the type of questions asked on the examination. All in all, students and teachers agreed that OBOW exams would be well equipped to prepare them for their careers (3.84 as compared to 4.14). It must be noted that for the question

regarding the preference of students towards OBOW exams, 99 of them (25.78%) strongly agreed and 179 of them (46.61%) somewhat agreed that OBOW exams would prepare them for their careers, making it a total of 72.4% of 384 students who answered this question.

### *Phase II*

A focus group study was conducted with 140 Commerce and Management students. 70 of such students (Test Group-I) would be subject to the closed book examination and the other 70 students (Test Group-II) to the OBOW examination. Study material on the topic 'Government debt and taxes' was prepared and given to both groups a week before the test. The participants were informed about the type of test they would sit for, and that there was an 'undisclosed incentive' for the two best answers to the study. A test was designed and given to the participants. The test contained hypothetical data containing various variables of the economy of a country and the questions were based on the study material. 25 minutes were given to answer the questions. The answers would be in the essay-type format. The researcher was physically present to monitor the participants for the duration of the test. After the responses were received from the participants, they were asked to fill up a feedback form that aimed to inquire about the ways in which they prepared for the test and if they were useful. The three best answers were awarded Amazon.com Vouchers worth INR 200 each.

As can be seen in Table 2 below, Phase-II results indicated that students in Test Group-I fared much better than Test Group-II students, in terms of not only understanding questions but also applying themselves in the examination. Additionally, the minimum and maximum scores were 50 and 80 for Test Group-I (OBOW) and 32 and 68 for Test Group-II (CB). Answers in Test Group-I were far more 'professional', 'logical' and 'impactful', as opposed to 'baseless', 'incomprehensible' and filled with 'conceptual errors.' Moreover, participants in Test Group-I found it relatively less arduous to analyze and interpret the data given in the test. This shows that the quality of answers improves when OBOW tests are used instead of Closed Book tests.

**Table 4: Descriptive Statistics for various sections of the Focus Group Test**

Test Items	OBOW		CB	
	Mean	SD	Mean	SD
Content	28.8	4.67	16.8	7.33
Logic	21	4.65	15	4.24
Presentation	21.6	2.25	18.6	5.82
<b>Total</b>	<b>71.4</b>	<b>10.93</b>	<b>50.4</b>	<b>14.54</b>

*Source: Authors' Calculations based on Focus Group Study Results*

A Chi-Square test was conducted to determine if there was a causal relationship between undergraduate marks and Phase II test scores. It was found that there was no statistically significant relationship between the two. Hence, it has been shown that those who are good at CB examinations are not necessarily good at OBOW examinations, it can be concluded that OBOW tests have a unique effect towards enabling students to write better answers and receive better scores. Since the only difference between the two types of examinations is the availability of information, the difference in scores can be attributed to the same.

A feedback form was given to the participants after they had submitted their answers. The Likert Means calculated using the responses can help analyze the behavior of students towards the test. Those taking OBOW tests read the material more (Likert Mean of 3.8) than those taking the closed book test (Likert Mean of 3.0). This is counterintuitive as those taking the OBOW test would have the material available while writing the exam. OBOW students may have prepared more as the test was of 25 minutes only and they would not get much time to refer to the material during the test. Students did not begin studying for the Phase-II examination in advance. This was true for both OBOW (Likert Mean of 2.2) and Closed book test-takers (Likert Mean of 2.0). OBOW test-takers agreed that this test helped analyze real-world data (Likert Mean of 4.2) compared to CB test-takers (Likert Mean of 3.6). Students did not agree that the given test was similar to how examinations are

conducted at the undergraduate level. (Likert Mean of 1.4 for Test Group-I and 2.0 for Test Group-II) This indicates that undergraduate courses do not test students using detailed information mirroring actual ground-based data. Closed book test takers experienced considerably more stress (Likert Mean of 3.6) while taking this test than OBOW test-takers (Likert Mean of 2.6). This can be attributed to the additional burden of having to recall memorized information. Closed book test-takers had much greater difficulty (Likert Mean of 3.8) analyzing the given data than OBOW test-takers (Likert Mean of 2.4) as they did not have access to information. Test Group-I students agree more on the feasibility of OBOW exams as a substitute (Likert Mean of 4.2) compared to Test Group-II students (Likert Mean of 3.4). This shows that those who have taken such a test are more likely to recommend it than those who have not.

## CONCLUSIONS AND RECOMMENDATIONS

Closed-book examinations in its present form were found to test memory more than higher-order life skills. Most commerce and management students appearing for such examinations were found to begin late preparations to ensure effective recall, which was the primary goal. In contrast, OBOW examinations proved to be comparatively more efficacious in terms of simulating real-world encounters and circumstances. The higher education system in India is indeed at a critical juncture with rising levels of graduates without adequate employable skills, and the most convenient and effective opportunity that can be tapped presently is the emerging digital revolution in the country, of which OBOW is a by-product. Phase I of the study found precedence of examinations that test 'recall' and by extension, 'memory'. 77 percent of subject papers were theoretical in nature and overlooked testing higher-order skills such as creativity. Students agreed to postpone the preparation of the examination and focused on short-term retention in favor of long-term synthesis of course-material with their pre-existing knowledge base. Both students and teachers surveyed in the study agreed that retention during the examination ensured better recall. They also agreed that OBOW examinations are superior to their CB counterparts in the context of facing real-life situations and

problems. Phase II of the study established that students performed better on OBOW examinations when compared to those who wrote the CB examination.

Notwithstanding, OBOW examinations often warrant new instructional procedures that address unique academic measures and degrees of garneting information. The real question that is often bypassed or overlooked in this situation is how the said undergraduate students are tackling the application-centric question asked in the examination, rather than the answer itself. Identified with this rationale, OBOW examinations, might even become trickier to develop and grade. It would necessitate more investments in terms of initiative and effort on the part of the academic staff to evaluate the examinations that are being conducted under the novel paradigm.

With the bourgeoning of multifarious learning administration frameworks, plentiful higher educational institutions have been incorporating web-centric pedagogical paradigms into their courses. In this context, OBOW examinations happen to be a novel solution wherein course instructors can devise questions that necessitate students to respond to open-ended questions in a more germane and descriptive manner. As the current study evidences, it would indeed result in stimulating high-order intellectual skills in their undergraduate learning programs, in contrast to archetypal closed-book exams that indorse memorization-based learning and a more superficial usage of information.

It is recommended that a phased implementation of the OBOW examinations be undertaken to ensure that a holistic array of skills is tested. It must be ensured that the course structure and pedagogy are revamped to make the change to OBOW examinations feasible. Notwithstanding, further research in OBOW examinations is advocated in the context of other disciplines and degree courses

## References

Ackerman R, & Leiser D. (2014). The effect of concrete supplements on metacognitive regulation during learning and open-book

test taking. *British Journal of Educational Psychology*, 84(2), 329-348.

Agarwal, P. K., Karpicke, J. D., Kang, S. H. K., Roediger Iii, H. L., & Mcdermott, K. B. (2007). Examining the Testing Effect with Open-and Closed-Book Tests. *Applied Cognitive Psychology*, 22, 861-876.

Agarwal, P. K., Karpicke, J. D., Kang, S. H. K., Roediger, H. L. III, & McDermott, K. B. (2008). Examining the testing effect with open-and closed-book tests. *Applied Cognitive Psychology*, 22(7), 861-876.

Albrecht, W. S., & Sack, R. J. (2000). Accounting education: Charting the course through a perilous future (Vol.). Sarasota, FL: *American Accounting Association*.

Bell, V., Bishop, D.V.M., Przybylski, A.K. (2015). The debate over digital technology and young people. *BMJ*;351: h3064.

Block, R. M. (2012). A Discussion of the Effect of Open-book and Closed-book Exams on Student Achievement in an Introductory Statistics Course. *PRIMUS*, 22(3), 228-238. . 565402

Block, R. M. (2012). A discussion of the effects of open-book and closed-book exams on student achievement in an introductory statistics course. *PRIMUS*, 22(3), 228-238.

Boniface, D. (1985). Candidates' use of notes and textbooks during an open-book examination. *Educational Research*, 27 (3), 201-209.

Brightwell, R., Daniel, J.H., Stewart, A. (2004, May). Evaluation: is an open-book examination easier? *Bioscience Education e-Journal*, 3.

Burdett, N. (2017, December). Review of High Stakes Examination Instruments in Primary and Secondary School in

Developing Countries. *Research on Improving Systems of Education*, 17/018, 18-21.

Damast, A. (2007, May 3). Duke works to stem Fuqua fallout. *BusinessWeek*.

Doghonadze, N., Demir, H. (2013). Critical Analysis of Open Book Exams for University Students. *ICERI2013 Conference, Seville, Spain*.

Eilertsen, T. V., & Valdermo, O. (2000). Open-book assessment: A contribution to improved learning? *Studies in Educational Evaluation*, 26(2), 91-103.

Feldhusen, J.F. (1961). An evaluation of college students' reactions to open-book examinations. *Educational and Psychological Measurement*, 21, 637-645.

Feller, M. (1994). Open-book testing and education for the future. *Studies in Educational Evaluation*, 20, 235-338.

Feller, M. (1994). Open-book testing and education for the future. *Studies in Educational Evaluation*, 20(2), 235-238.  
[https://doi.org/10.1016/0191-491X\(94\)90010-8](https://doi.org/10.1016/0191-491X(94)90010-8)

Firth et al, (2019). The "Online Brain": How the internet may be changing our cognition. *World Psychiatry*, 18, 119-129.

Gilbert, I. (2011). Why do I Need a Teacher When I've got Google? *Routledge*, 1, 112-116.

Green, Ferrante, C.J., Heppard, K.A. (2016). Using Open-Book Exams to Enhance Student Learning, Performance, and Motivation. *The Journal of Effective Teaching*, 16(1), 19-35.

Heersmink, R. (2016). The Internet, cognitive enhancement, and the values of cognition. *Minds and Mach*, 26, 389407.

Ioannidou, M. (1997). Testing and life-long learning: open-book and



closed-book examination in a university course. *Studies in Educational Evaluation*, 23(2), 131-139.

Ioannidou, M. K. (1997). Testing and life-long learning: Open-book and closed-book examination in a university course. *Studies in Educational Evaluation*, 23(2), 131-139. [https://doi.org/10.1016/S0191-491X\(97\)00008-4](https://doi.org/10.1016/S0191-491X(97)00008-4)

Jehu, D., Picton, C.J., & Fucher, S. (1970). The use of notes in examinations. *British Journal of Educational Psychology*, 40, 353-357.

Kalish, R.A. (1958). An experimental evaluation of the open-book examination. *Journal of Educational Psychology*, 49, 200-204.

Kapur, M. (2019). India's culture of high-stakes testing needs to be dismantled. Retrieved from

Koutselini, M. (1995). A comparison study of sophomore students' perceptions of the traditional and the open-book examination. *Improving University Teaching- Contributed papers, Twentieth International Conference, Hong Kong*, 542-553.

Michaels, S.A., & Kieren, T.R. (1973). An investigation of open-book and closed book examinations in mathematics. *Alberta Journal of Educational Research*, 29 (3). 202-207.

Mishra, A., Gupta, A., Narechania, A., Kumar, A., & Nadh, C. (2014). *Improving the Indian Education System Using Germany as a Benchmark*. [http://www.iitmandi.ac.in/ISTP/projects/2014/reports/Group 17 India Germany.pdf](http://www.iitmandi.ac.in/ISTP/projects/2014/reports/Group%2017%20India%20Germany.pdf)

Moore, R., & Jensen, P. A. (2007). Do open-book exams impede long-term learning in introductory biology courses? *Journal of College Science Teaching*, 36(7), 46-49.

Nanda, P.K. (2019). Searching for jobs: India's tuition trapdoor. Retrieved from <https://www.livemint.com/politics/policy/searching-for-jobs-india-s-tuition-trapdoor->

1548787140226.html

- Sparrow, B., Liu, J., Wegner, D.M., (2011). Google effects on memory: cognitive consequences of having information at our fingertips. *Science*, 333, 776.
- Theophilides, C. (1994, July). The major functions of the open-book examination: A factor analytics study. *Improving university teaching- Contributed papers, Nineteenth International Conference* (pp. 4-7). University of Maryland, USA.
- Theophilides, C., & Koutselini, M. (2000). Study behavior in the closed-book and the open-book examination: A comparative analysis. *International Journal of Phytoremediation*, 21(1), 379-393. <https://doi.org/10.1076/edre.6.4.379.6932>
- Theophilides, C., Dionysiou, O. (1996). The major functions of the open-book examination at the university level: A Factor Analytic Study. *Studies in Educational Evaluation*, 22(2), 157-170.
- Vanderburgh, P. M. (2005). Open-book tests and student-authored exam questions as useful tools to increase critical thinking. *Advances in Physiology Education*, 29(3), 183-184.
- Vygotsky, L. S. (1978). *Mind in society: the development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Ward, A.F. (2013). Supernormal: how the Internet is changing our memories and our minds. *Psychol Inq*; 24:3418.
- Webber, L.J., McBee, J.K., & Krebs, J.E. (1983). Take home tests: An experimental study. *Research in Higher Education*, 18, 473-483.
- Wegner, D.M. & Ward, A.F. (2013). The internet has become the external hard drive for our memories. *Sci Am*; 309:5861.
- Weisberg, M. (2011). Student attitudes and behaviors toward digital textbooks. *Publishing Research Quarterly*, 27(2), 188-196.

Williams, J. B., & Wong, A. (2009). The efficacy of final examinations: A comparative study of closed-book, invigilated exams and open-book, open-web exams. *British Journal of Education Technology*, 40(2), 227-236.

