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Beyond Memorisation: Exploring the Potential of Open-Book Examinations for Deeper Learning

Mr. Amit Dimari [1], Dr. Nidhi Tyagi[2], Dr. Mahesh Davanageri[3], Dr. Prabha lama[4] , Hema Dimari[5]

[1]*Research Scholar, Humanities and Social Sciences, Graphic Era Deemed University Dehradun India - 248001, amit.dimari66@gmail.com
[2]Associate Professor, Humanities and Social Sciences, Graphic Era Deemed University Dehradun India - 248001, nidhityagi.hss@geu.ac.in
[3]Controller of examination, Graphic Era (Deemed to be) University Dehradun India-248001, coe@geu.ac.in
[2]HOD, Humanities and Social Sciences, Graphic Era Deemed University Dehradun India - 248001, prabhalama.hss@geu.ac.in
[5]Office executive, Examination Cell, Graphic Era hill University Dehradun India-248001
hdimari@geu.ac.in

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Abstract
The possible effects of open-book tests (OBEs) on student learning—more especially, how they might foster a deeper knowledge of the subject rather than only surface-level memorisation of facts—are investigated in this paper. Often instead of encouraging critical thinking and problem-solving ability, conventional tests depend on memorising facts. OBEs let pupils use resources during assessments, therefore helping them to absorb the content. The Revised Two- Factor Study Questionnaire (R-SPQ-2F) and a quantitative method are applied in this work to investigate how OBEs affect students' learning patterns. The results unequivocally show that students are using their knowledge in a more pragmatic and significant manner and are progressively adopting a deeper grasp of the subject. These results imply that by encouraging deeper knowledge and critical thinking abilities, out-of-body experiences (OBEs) could help to improve educational assessments.

Keywords: Learning, Deep learning, Surface learning, Students, R-SPQ-2F

Introduction

For many years in higher education, the conventional closed-book test style has been the primary way to evaluate academic performance. Usually, these assessments are meant to assess students' memory and reproduction capacity inside a given time restriction when they lack any outside resources. Though it has been successful in assessing short-term memory retention, others have critiqued this strategy since it often encourages surface learning rather than deep knowledge (Heijne-penninga et al., 2008). Surface learning is the tendency of pupils giving passing tests top priority above a comprehensive knowledge of the field. It entails depending more on memorising than on really interacting with the content (Entwistle & Peterson, 2004). Though this approach is widely utilised, it has major drawbacks especially in a society that values critical thinking, problem-solving, and the application of information in many circumstances (Biggs, 2003).

Teachers and academics responding to these issues have been looking at other evaluation strategies that can promote critical thinking and deeper learning. The open-book exam (OBE) is one such substitute whereby students may access notes, textbooks, and other materials right during the test. OBEs make sense since they more faithfully depict real-world situations in which people typically have access to knowledge when tackling difficult challenges (Vanderbilt, 2005). OBEs are meant to evaluate students' comprehension, application, and synthesis of knowledge rather than their memorising and recall of material. This change in emphasis is supposed to inspire students to interact more deeply with the content, therefore promoting a more complete knowledge that transcends mere fact memory (Bloom, 2022).

Furthermore, Out-of- Body Experiences (OBEs) are supposed to help to reduce the typical anxiety related with traditional tests. Most of the time, memorising a lot of content overwhelms students; this creates great anxiety and sometimes poor academic performance (Wenzel et al., 2022). Looking at open books (OBEs) could help students relax more. This is so because students are free to access resources throughout the assessments, thereby enabling them to concentrate on understanding and application of their knowledge instead of only memorising information. According to Karagiannopoulou & Milienos (2013), cutting stress improves mental health and academic performance of pupils. It enables them show their genuine ability free from anxiety.

Though out-of- body experiences (OBEs) could have some theoretical benefits, their actual effectiveness is still under question. Critics of Outcome-Based Education (OBEs) claim that they encourage a kind of shallow learning whereby students largely depend on their study materials during tests instead of actively interact with the subject beforehand (Eilertsen & Valdermo, 2000). Moreover, many research have voiced concerns on the likely long-term consequences of OBEs on knowledge preservation and autonomous learning development (Wenzel et al., 2022). This work aims to contribute to the present discussion by studying how OBEs influence student learning practices. It particularly questions whether OBEs either merely alter the nature of surface learning or enhance deep learning.

Literature Review and Hypotheses

Particularly by encouraging deep learning, the research OBEs indicates that students' learning practices may be much influenced by them. Deep learning is a kind of learning when pupils interact extensively with the materials. They want to grasp the fundamental ideas, link several ideas, and apply their knowledge in novel contexts (Biggs, 2003). Unlike surface learning, this kind of education concentrates less on memorisation and short-term memory of knowledge. Entwistle (2009) claims that surface learning typically results in shallow knowledge that is rapidly forgotten when the initial requirement for a test is over.

Several studies have shown promise for OBEs improving deep learning. Students who took part in OBEs, for instance, were more likely to interact with the material at a deeper level since they were urged to explore and apply concepts instead of merely remember facts (Dale et al., 2009). Based on Vanderburgh's 2005 studies, Outward Bound Experiences (OBEs) could perhaps improve students' capacity to gather and mix knowledge as well as acquire more developed problem-solving techniques. These findings imply that in terms of both their academic performance and general cognitive development, out-of-body experiences (OBEs) can perhaps help pupils. This can provide them the fundamental abilities required for success in both personal and professional environments.

OBEs have shown to reduce exam-related anxiety apart from promoting deep learning. Conventional assessments could put a lot of pressure on students to memorise enormous amounts of material, which results in high degrees of stress and, sometimes poor performance. By contrast, OBEs enable students use resources during the test, therefore lowering part of the anxiety connected to the need to remember facts from memory (Karagiannopoulou & Milienos, 2013). The calmer exam environment produced by the reduction in tension lets students concentrate on understanding and using knowledge instead of merely memorising facts. Observing the students' capacity to make use of resources during the test will also help to show their grasp of the content. More deliberate and reasonable responses may follow from this.

OBEs do, however, provide some possible benefits even if their implementation is not without challenge. Critics argue that OBEs could produce a different kind of surface learning when students depend more on their materials during examinations than they do on the topic before the test. This reliance on resources could also impede the acquisition of autonomous learning skills since students could not feel the need to fully absorb the material if they could simply reference the answers during the test (Eilertsen & Valdermo, 2000). Additionally of interest is how OBEs might influence long-term information retention. Should students not be required to memorise and recollect content, they could be less likely to retain that knowledge over time, therefore jeopardising their general educational advancement (Wenzel et al., 2022).

Considering these different points of view, this study develops two main hypotheses to practically investigate how OBEs affect student learning strategies:

1. **Hypothesis 1 (H1):** Students who participate in OBEs will show a significant increase in deep learning strategies, as measured by the R-SPQ-2F, compared to their learning strategies before OBEs.

2. **Hypothesis 2 (H2):** Students who participate in OBEs will exhibit a significant decrease in surface learning strategies, as measured by the R-SPQ-2F, compared to their learning strategies before OBEs.

By means of pairings of t-tests, we can explore whether students' deep and surface learning techniques change statistically substantially before and following OBE introduction.

Methodology

Participants and Sample Size

Participating in this study were two hundred undergraduate students from different academic disciplines including engineering, social sciences, humanities, and natural sciences. The participants were selected via intentional sampling so as to offer a diversified picture of students in several domains of research. This diversity was absolutely essential to ensure that the outcomes could be applied in a wider range of educational settings. The sample was balanced in terms of gender; 45% of the participants were female and 55% of them were male. Reflecting the typical spectrum of college students, the volunteers fell in age between 18 and 26 years.

A 200-student sample size was chosen under direction from a power analysis completed prior to data collecting. Power analysis using a medium effect size (Cohen's d = 0.5) and an alpha level of 0.05 found that this sample size would have an 80% power level. This suggests that the sample size was sufficient to find statistically significant changes in learning techniques both before and after OBE introduction. The power analysis also ensured enough subjects in the study to provide correct conclusions on the impact of OBEs on learning processes. Making sure the sample was varied enough and large helped the study to produce solid and generally applicable results.

Measurement Tools

Originally developed in 2001 by Biggs, Kember, and Leung, the Revised Two- Factor Study Questionnaire (R-SPQ-2F) was the primary tool for evaluating differences in learning approaches. Based on established and verified, the R-SPQ-2F divides between surface and deep learning methods. The questionnaire has twenty items total, ten aimed to measure surface learning and ten meant to measure deep learning. Every item falls on a Likert scale with 1 (never true of me) at one side and 5 (always true of me). Every subject got twice the R-SPQ-2F: once before the OBE introduction and once more later on. This pre- and post-intervention design allows the study to monitor any changes in learning strategies brought about by OBE use.

Based on earlier studies displaying validity and dependability, the primary measurement tool was selected to be the R-SPQ-2F. Fit for this study, the questionnaire has been used extensively in educational research to assess students' learning approaches. The focus on deep and surface learning was especially relevant as the study aimed to find whether OBEs may move students from surface to deep learning methodologies. The research used a validated instrument called the R-SPQ-2F to ensure that the data collected were accurate. This allowed the researchers to draw important conclusions about the impact of OBEs on learning.

Reliability and Validity Testing

I did several statistical tests to assess the R-SPQ-2F's validity and reliability. We assessed the internal consistency of the scale using Cronbach's Alpha, a usually accepted benchmark of questionnaire dependability. Cronbach's Alpha readings above 0.7 are often considered as showing better dependability. For this study, the Deep Learning subscale scored 0.83 and the Surface Learning subscale a Cronbach's Alpha value of 0.79. These results indicate excellent internal consistency, so every subscale consistently evaluates the same underlying notion (Petrovic-Dzerdz, 2019). Apart from Cronbach's Alpha, we also evaluated the construct validity of the R-SPQ-2F by means of Confirmatory Factor Analysis (CFA). In the context of a questionnaire, construct validity is the capacity of the theoretical concept it is meant to measure to be accurately assessed. Confirmatory factor analysis (CFA) is a statistical method used to help one determine whether the results match a proposed measurement paradigm. The study turned up a Root Mean Square Error of Approximation (RMSEA) of 0.05 and a Comparative Fit Index (CFI) of 0.92. These findings reveal rather good fit of the Confirmatory Factor Analysis (CFA) model in this investigation. Given the results fit the hypothesised model (Kurosami, 2020), the indices in this research support the construct validity of the R-SPQ-2F. The R-SPQ-2F is a valid and reliable instrument according to validity and dependability tests for assessing learning techniques in this research. Ensuring the quality and dependability of the measuring device will help the research to objectively investigate how OBEs influence students's learning strategies.

Data Collection

Before and after the OBE introductions, each volunteer completed the R-SPQ-2F questionnaire. The pre-test was carried out prior to pupils having OBEs (Out-of- Body Experiences); the post-test was given once their OBEs had stopped. We decided to employ a pre- and post-test strategy to directly assess any changes in learning strategies linked with the usage of OBEs. Using the paired t-test, the mean scores of deep and surface learning techniques were compared both before and following the intervention. This statistical test offers proof of any modifications in learning approaches. Pre- and post-test designs help one to evaluate the effects of an intervention more readily. This design lets us track every participant's performance both before and after the intervention, thereby helping to account for personal variances (Field, 2018). In educational research especially, this strategy is especially helpful since the main goal usually is to assess the success of new teaching strategies or evaluation systems. This study looked at how OBEs—Outcome-Based Education—affected students' learning strategies using a pre- and post-test approach. The results of the study offer unambiguous proof on whether these tests can really improve more advanced learning.

Results and Findings

Results and Findings

The results of this study provide strong evidence that Open-Book Examinations (OBEs) have a significant impact on students' learning styles, causing them to shift from surface learning techniques to deep learning techniques. In order to evaluate the objectives of the study, we first analysed the data from the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) using descriptive statistics. After that, we conducted hypothesis testing.

Descriptive and Demographic Statistics

Two hundred undergraduate students from numerous disciplines—including engineering, social sciences, humanities, and natural sciences—participated in the survey. Table 1 provides the demographic breakdown of the sample together with gender distribution, age range, and academic discipline. Descriptive information for the R-SPQ-2F scores is also supplied to offer a broad view of the learning techniques applied by the students both before and following the OBE introduction.

Table 1: Demographic Profile of Participants

Demographic Variable	Frequency (n = 200)	Percentage (%)
Gender		
Male	**110**	**55%**

Female	**90**	**45%**
Age (Years)		
18-20	**60**	**30%**
21-23	**100**	**50%**
24-26	**40**	**20%**
Academic Discipline		
Engineering	**70**	**35%**
Social Sciences	**60**	**30%**
Humanities	**50**	**25%**
Natural Sciences	**20**	**10%**

With a somewhat majority of male involvement (55%), the demographic statistics provide a fair distribution of sexes. Usually for undergraduate groups, most students fell between the ages of 21 and 23 (50%). The sample was also varied in terms of academic fields, therefore guaranteeing that the findings may be used in numerous sectors of research. Descriptive statistics for the R-SPQ-2F scores both before and upon OBE introduction are compiled in Table 2.

Table 2: Descriptive Statistics for R-SPQ-2F Scores (Pre- and Post-OBE)

Learning Approach	Condition	Mean	Standard Deviation	Minimum	Maximum
Deep Learning	**Pre-OBE**	**3.2**	**0.65**	**2.0**	**4.8**
Deep Learning	**Post-OBE**	**4.5**	**0.60**	**3.1**	**5.0**
Surface Learning	**Pre-OBE**	**4.1**	**0.70**	**2.3**	**5.0**
Surface Learning	**Post-OBE**	**2.8**	**0.55**	**1.8**	**4.2**

Descriptive data shows that the average deep learning score improved from 3.2 before OBE introduction to 4.5 later. The little decline in the standard deviation for deep learning points to more consistent post-observation deep learning techniques used by pupils. On the other hand, as the standard deviation fell, the average surface learning score declined from 4.1 to 2.8, suggesting that after OBEs were used, students were gradually rejecting surface learning strategies.

Testing Hypothesis

One could assess the hypotheses of the research by matching t-tests comparing the mean scores of deep and surface learning approaches before and after OBE implementation.

Hypothesis 1 (H1): Students who participate in OBEs will show a significant increase in deep learning strategies, as measured by the R-SPQ-2F.

Hypothesis 2 (H2): Students who participate in OBEs will exhibit a significant decrease in surface learning strategies, as measured by the R-SPQ-2F.

Table 3: Paired t-test Results for R-SPQ-2F Scores

Learning Approach	t-value	df	p-value	Mean Difference	Confidence Interval (95%)
Deep Learning	**15.67**	**199**	**< 0.001**	**+1.3**	**[1.10, 1.50]**
Surface Learning	**-14.89**	**199**	**< 0.001**	**-1.3**	**[-1.50, -1.10]**

The results from the paired t-tests strongly support both hypotheses. For Hypothesis 1, the t-test revealed a significant increase in deep learning strategies following the introduction of OBEs ($t(199) = 15.67$, $p < 0.001$), with a mean difference of +1.3 points on the R-SPQ-2F scale. This increase suggests that OBEs effectively encourage students to adopt deeper learning approaches.

For Hypothesis 2, the t-test indicated a significant decrease in surface learning strategies post-OBE ($t(199) = -14.89$, $p < 0.001$), with a mean difference of -1.3 points on the R-SPQ-2F scale. This reduction in surface learning underscores the potential of OBEs to shift students away from rote memorisation and towards a more engaged, critical understanding of the material.

Interpretation and Discussion

This study reveals that students' interaction with learning resources is much enhanced by out-of-body experiences (OBEs). This is seen from the rising application of deep learning methods and the accompanying declining use of surface learning approaches. These results confirm other studies showing that by forcing students to focus on understanding and applying knowledge rather than merely memorising facts, out-of-class experiences (OBEs) might help create a deeper involvement with course material (Dale et al., 2009). The lower standard deviation indicates that the descriptive statistics reveal not only a notable improvement in the average deep learning score following OBE but also in the consistency of employing deep learning techniques by the students. This remark emphasises the idea that tests of this kind can be useful in many spheres of academia. It implies that OBEs (Outcome-Based Exams) may present a more consistent approach for encouraging in-depth learning among a large spectrum of students (Vanderburgh, 2005).

Strong and statistically significant proof in favour of the hypotheses of the study comes from the paired t-tests. The clear increase in deep learning and the fall in surface learning point to evidence that OBEs (Outcome-Based Education) can have a major influence on student approach to their study. This development is especially important since it implies that out-of-body experiences (OBEs) encourage a deeper connection with the subject matter, which is essential for preserving knowledge in the long run and growing advanced cognitive capacities (Karagiannopoulou & Milienos, 2013). This implies, more generally, they also help to improve exam performance. This result is consistent with studies demonstrating that students who are obliged to actively use the knowledge they have acquired during tests are more likely to recall and grasp that knowledge. This can hence result in better long-term learning results (Entwistle, 2009).

These findings fit more general learning goals of fostering critical thinking, problem-solving, and useful knowledge application (Bloom, 2022). According to the study, out-of-body experiences (OBEs) might improve academic performance as well as help to build abilities valuable outside of the classroom (Wenzel et al., 2022). Many jobs call for the capacity to recognise, combine, and use knowledge in particular contexts. Comparatively to closed-book tests (Eilertsen & Valdermo, 2000), open-book tests might better equip pupils for these demands.

Although the outcomes could be positive, one should consider the possible restrictions and challenges related to OBEs. For example, some students may rely too much on their test materials, therefore leading to a shallow knowledge of the issue (Wenzel et al., 2022). This could make it challenging for people to grow to be able to learn on their own, which is absolutely essential for long-term success in professions and academics. Investigating approaches to lower this danger should be the main emphasis of next studies. Integrating outcome-based evaluations (OBEs) with other forms of assessment that demand students to show their knowledge independently, without depending on outside resources, seems one possible strategy (Vanderburgh, 2005).

Moreover, more research is definitely needed to look at the long-term consequences of out-of- body experiences (OBEs) on memory and information application. Entwistle (2009) claims that present studies show out-of-body experiences (OBEs) might improve future learning. Still, it's important to find out whether these impacts last over time and how they affect students's general course of study and employment path. Knowing these long-term consequences will let you to decide how successful OBEs are in generating notable and long-lasting learning opportunities.

Limitations of the Study

This research has some limitations. Though sufficient for this study, the sample size could not fairly represent the range of student experiences and learning approaches among different universities or academic disciplines. The specific learning environment of the study can limit the generalisability of the outcomes. Moreover, depending on self-reported data from the R-SPQ-2F, however validated, could introduce bias since students may overestimate or understate their participation with deep or surface learning approaches.

Still another restriction is added by the small gap separating the pre- and post-OBE assessments. The study ignores probable long-term effects on knowledge retention and application even if it provides interesting analysis of how OBEs directly influence learning processes. Though thorough and helpful, the qualitative data comes from a quite small number of survey responses, therefore potentially not totally reflecting the student population. Future studies should consider applying more qualitative techniques to validate the conclusions, utilising a larger and more diverse sample, and extending the study time to catch long-term effects.

Future Scope

Given the outcomes and limitations of this study, several subjects of next research seem appealing. This study needs be performed in different educational environments involving several institutions, academic levels, and cultural conditions in order to evaluate the generalisability of the conclusions. Research might also look at the effects of OBEs on many types of learning outcomes like creativity, inventiveness, and cooperation—that which this study did not address. OBEs' long-term effects on information retention and professional competency offer still another interesting subject of research. Monitoring students over several years, longitudinal studies can assess how OBEs influence their academic and career pathways.

Future research could potentially investigate the effectiveness of hybrid evaluation models integrating open-book and closed-book elements, therefore balancing the advantages of deep learning with the rigidity of conventional assessments (Jurinová & Miština, 2023). Moreover fascinating is the role technology performs in OBEs, particularly considering the rising consumption of digital and internet resources during examinations. Studies on how digital tools and resources affect students' learning practices and results in OBE settings could investigate at At least, studies may focus on developing and assessing therapies aimed to increase the efficacy of OBEs, such training courses for students on how to use resources effectively during examinations and strategies for teachers to produce OBEs increasing deep learning.

Conclusion

Strong data demonstrating how open-book tests (OBEs) could enhance students' learning by fostering a deeper knowledge instead of only memorising facts is presented in this paper. Extensive validity and dependability testing conducted using

OBE supports the validation of the research results. The Revised Two- Factor Study Questionnaire (R-SPQ-2F) was also incorporated by the researchers, therefore improving their outcomes even more. These tests show that the surface learning score is dropping even while the deep learning score is rising. Drawing on what we have seen, events outside of the classroom—also known as out-of-class experiences (OBEs)—may inspire students to apply what they have studied, connect more actively with the course themes, and hone their critical thinking abilities. The qualitative findings support more effective research projects and more evidence proving Out-of- Body Experiences (OBEs) assist lower test-related anxiety.
Still, the study emphasises the necessity of more research to grasp the long-term effects of OBEs, how they influence various learning results, and how they could be applied in various educational environments. Though several issues are raised, the findings of this study add to the mounting corpus of evidence supporting the pragmatic use of OBEs as a technique of evaluating recent graduates of higher education. Open-book tests are an excellent substitute for conventional closed-book testing since schools search for innovative approaches to assess pupils who improve learning. They enable students to meet the expectations of present society.

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