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A Review on Implementation Challenges and Measures of Exit Exam to Enhance and Assure the Quality of Engineering Education at Ethiopia HEIs

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Abstract: Education is the most primary sector in the world, making a significant contribution to national and international development. Different countries have their own national education policies, as well as international policies. As part of the globe, Ethiopia has its own curriculum for various programs aimed at attaining quality education by increasing the competency of learners. This review paper primarily examines the pre-and post-implementation challenges and measures of Exit Exam, which are intended to be implemented at Ethiopian higher education public and privet institution under-graduate programs to improve and ensure the quality of education, and then to increase employment and competency rates. For this review purpose different researches, curriculum documents, education policies, guidelines from institutional, national and international perspectives are reviewed. In Ethiopia, Various exit exams are given for students, such as the ministry exam for grade eight, the matric exam for grade ten, an Entrance exam for grade twelve, and now the exit exam is planned to be given for undergraduate university students at their final year to measure the overall competence of learners and their institute. This review focuses on exit exam significances and challenges in terms of implementation to measure the attitude, knowledge and skill of graduates in terms of engineering competency such as field work skills, experimental skills, programing skills, analytical skills as the exit exam is multiple choice types. For solving those gaps, a critical recommendation of pre and post implementation strategies are indicated for education policy makers and curriculum experts for preparing guideline for exit exam to enhance and assure engineering graduates competences. From this assessment based review, literatures strongly agree the presences and importance of exit exam for university graduates, but they indicate also the pre and post implementation gaps of this exam, in which this review paper try to address this gaps.

Keywords: Curriculum, Mock Exam, Exit Exam, Competency, Quality Enhancement, Quality Assurance

1. Introduction

As we enter the twenty-first century, the engineering profession is undergoing rapid change in market demands. "Engineering profession is beyond a career," some developed countries say to emphasize the global importance of engineering professions. So, in this technologically advanced world, engineers' role and skill should be enhanced to include being innovative, skilled, competent, creative and technological entrepreneurs. To keep up with global competitiveness, Ethiopia now has over 45 government higher education institutes offering a variety of disciplines in Degree, Masters and PhD programs. Those professionals who graduated from those institute were unable to address the country's economic, social, political, and technological problems due to the incompetency of curriculum related to teaching and assessment systems.

In developing countries, there are numerous primary, intermediate, tertiary, and higher education institutions, but the issues of access and quality education remain unsolved. Due to this reason, education does not adequately address the economic and technological aspirations of developing countries in African, especially in Ethiopia. Many studies, projects, and policies are being done to improve educational

access and quality to global standards, but yet not the problem is solved. To enhance and assure quality education Ethiopian HEIs take various measures like revising curriculums, teaching methods, assessment method, industry-based teaching, peer learnings and so on but still no significant changes are observed in engineering education competences.

Based on the prevalence of Higher Education Proclamation Proc. No. 1152/2019 provided that "… the teaching-learning process shall be continuously updated in its design, delivery methods, and assessment instruments". Ethiopian MOE plans to conduct exit exams at HEIs graduating programs to increase competency of graduates and accreditation of institutions based on national and international goals.

Because there is a very serious ambiguity on the relevance and implementation mechanisms of exit exam among students, teachers, private and government HEIs, this review paper is conducted to indicate challenges and indicate implementations mechanism and is purpose based on international experiences. To understand the exit exam's relevance and implementation tactics I read several research papers about qualification exams, exit exams, holistic exams, entrance exams, matric exams, and COC exams.

2. Statement of the Problem

The Ethiopian curriculums and its teaching and assessment mechanism is not effective as per global standards, because it is not supported by research, not contextual within national values and assets, not discipline specific, not well supported by organized education infrastructure and focusses on curriculum goal rather than the process. Due to this, various students taking competency exam, job entry exam and scholarship exam are not competent with global standards as evaluated in the three learning domains. This review paper is done to indicate the pre and post exit examination challenges and measures planned to be given at Ethiopian HEIs graduates.

3. The Objectives of the Review

The purpose of this review paper is to identify the challenges, benefits, limitations and recommendations of the exit exam implementation at Ethiopian HEIs aiming to address the following research objectives.

1) Basic challenges of exit exam
2) Stakeholders of exit exam implementation
3) Pre implementation strategies
4) Post implementation strategies
5) Exit exam and curriculum dilemma
6) Recommendations for policy makers

4. Methodology

This review research study is conducted by compiling relevant research and practical experiences on the importance of Exit Exams to undergraduate students in Ethiopian higher education institutions. In this paper, research papers on the TVET COC exam, medical students' qualification exam, foreign countries engineering students' exit exam, the holistic exam for engineering students, entrance and matric exam for high school students, engineering curriculums are reviewed and information's are interpreted to address research objectives in such a way that an exit exam will be effectively applicable at Ethiopian HEIs to improve and ensure educational quality.

5. Literature Review

5.1. Review Purpose

A systematic and critical review related to the current review study is performed to understand the perception, gaps, and challenges of Exit Exam implementation to enhance and assure the quality of the engineering profession as part of the curriculum, and hence, to indicate the effective implementation mechanism of exit exam to increase the competence of graduating students at Ethiopian universities as well as in other global universities. The following and other related literature are reviewed to obtain useful information for this review study.

5.2. Related Literature Reviewed

Ludger Wosse Mann [1] *has been noted that to achieve* the policy goal of improving student performance fulfilling resources to schools are essential. The author also indicates that central exit exam is an important framework to make responsible students, teachers and academic leaders for the all-over academic achievements of students. The author also indicates the relation of exit exam with student achievement, labor market outcome and economic growth.

Jürges, *Costrell*, *Effinger and Jürges [2]*, states that Exit exam are previous progressive performance of students for high school graduates to join university and TVET graduates to join working industries. The author also shows the effectiveness of such exam result in positive effects on student achievement because of incentives for both teachers and students.

Meyer, *Pedulla* and *Ryan [3]*, On the other hand, those author studies have shown that the negative impact of exit exams on students' motivational and emotional experiences leads to increased stress, anxiety, or fatigue to their learning.

Jürges [4], relates the negative effects and pressures of exit exam on students' motivation and emotion is due to by teachers.

Merki and *Zimmermann [5]*, the research and practical importance's of exit exam uses to students' learning and performances to their professional skill and knowledge.

Bishop and *Wossemann [6]*, supports the main goal of implementing exit exams is to encourage students to put effort into their learning referring theoretical models.

Young, Macale etl [7], states the presence of examinations for professional licensing for different disciplines, but exit exams to measure students overall performance at the end of their undergraduate study is not common. The author argue that exit exam should be given for BSc graduate students to increase their level of competence before and after the exam.

Mazurek [8], indicates that, exit exam was used as an assessment tool for engineering programs since 1990. And also, the author noted, besides basic engineering aptitude, several factors have been recognized to contribute to performance, with "motivation to pass" as one of the most significant factors.

Watson [9], By his subsequent analysis, he concluded that the exit examination generated significant amounts of useful assessment data that was not being utilized by engineering programs to be used in academic performance indicators.

Eyob Ayenew [10], conducted a review study about the purpose and necessity of exit exam, awareness of stakeholders, challenges, strengths and weakness of exit exam which is going to be implemented at Ethiopian higher education public and privet university.

Koehn, E., Koehn, J. F. etal [11], has been performed outcome based Assessment of Performances on the Fundamentals of Engineering (FE) Examination on the learner's knowledge and skill as per stetted goals of the curriculum.

Jürges, H., Schneider, K., etl [12], has been performed an assessment of the driving effects of exit exam on curriculum-based knowledge and mathematical literacy of learners.

Nirmala Handan, N., White, K. [13], has been Conducted a case study on exit exam outcome assessment for the purpose of refining the courses in the curriculum and in the program.

Test Blueprint for National Exit Examination guideline [14], states a detail information about core module, core courses, the number of questions for each module, course and learning domain (skill, attitude, knowledges). According to this guideline 100 multiple choice will be prepared to asses students five-year performance, which will be hard to measure the students experimental skill, computer skill and filled work skills as hands on practice as an engineering graduate. According to these guidelines for civil engineering exit exam candidates 90% of the exam are knowledge based, 10% the exam is attitude based and 0% of the exam are skill based.

6. Current Practice in Ethiopia

Grade 12 Students in Ethiopia is taking an entrance exam to join university. After enrolling at university, students will complete a one-year common courses to decide college and department they will pursue their future profession. Students such as health and medical sciences are required to learn and be evaluated regularly to develop their professional attitude, competence, skill, and knowledge. Those professionals take qualification exams at various times and Licensee exam during their graduation year, to make them more knowledgeable and effective than other professionals in our country.

However, because engineering profession has less attention and recognition in our country, the quality and competency of graduating and senior engineers are not as strong as in other nations. Even though different laboratories are fully stocked, curriculums are established, different teaching and assessment methods are implemented, industrial internships are practiced, and field education is conducted to improve engineering education quality, the challenges remain unsolved.

Most university engineering students, for example, take a Holistic exam at their third or fourth year of study. This exam is part of the curriculum, the exam type is multiple choice which is not used for grading purpose. Due to this, no one has looked at the importance of this exam in the curriculum.

As a result, the MOE's decision to implement exit exam for undergraduate students is appreciable, particularly for engineering and technical professions, because it will aid in improving and assuring the quality of education by increasing the accountability and responsibility of students, teachers, and institutions than before to achieve the national education goal.

7. Review Summary

7.1. Curriculum and Learning Objective

The curriculum is a road map for learner-teacher interaction to achieve specific skill, attitude, and knowledge through the continuous learning and assessments. Depending on the local, regional, national and international importance of the profession, the curriculum may be launched, revised, improved, or rejected. The general and conventional Curriculum development process is illustrated in the following figure.

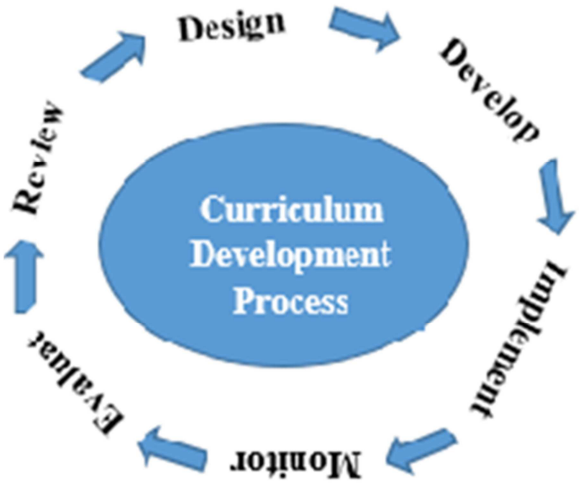

Figure 1. *(Mahmoud Al Ahmad, Conventional curriculum development process, 2014).*

7.2. Exit Exam and Curriculum

The curriculum may be subjected to change in terms of content, teaching mechanism, evaluation mechanisms, goal and teaching materials as a result of current experiences with the outcomes and performances of exit exam. A basic diagrammatic relationship between the curriculum development process and the exit exam role is depicted in the following diagram.

From the curriculum objective, the assessment, teaching and learning method, education infrastructures as well educational management is aimed at achieving the three-leaning domain of a certain program. Achieving all this learning domain through teaching is a challenge and through

assessment is a being challenge for teachers and institutions especially in practical based engineering profession. The following triangulated diagram is showing the inter relation between the three learning domains to achieve the overall competency of programs.

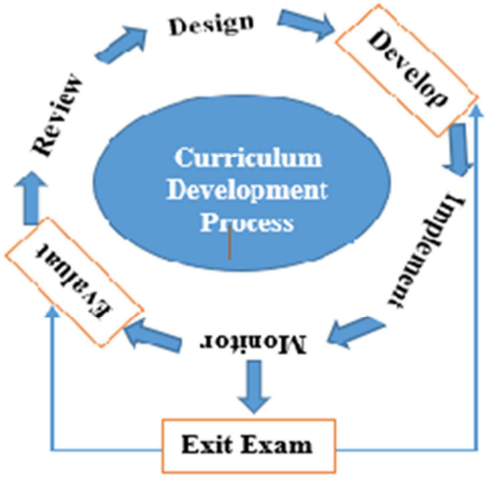

Figure 2. *(Mahmoud Al Ahmad, curriculum development process and exit exam feedbacks, 2014).*

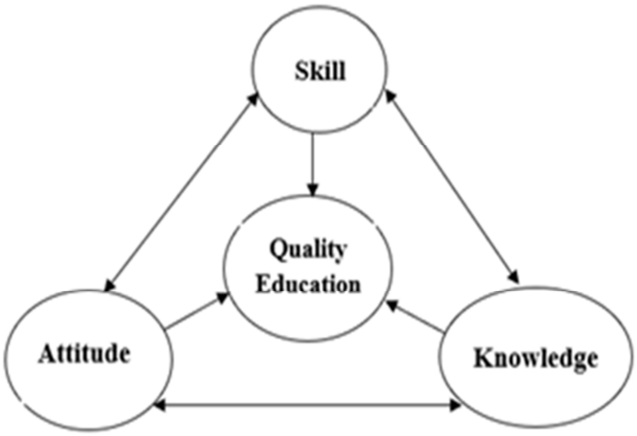

Figure 3. *Learning outcome from a certain profession.*

7.3. Pre-Implementation Strategies

Exit examinations are more powerful than course work tests in terms of activating progressive and integrated professional learning. The following pre-examination strategies shown in (Figure 4) should be followed to ensure a successful exit exam in measuring students' achievement.

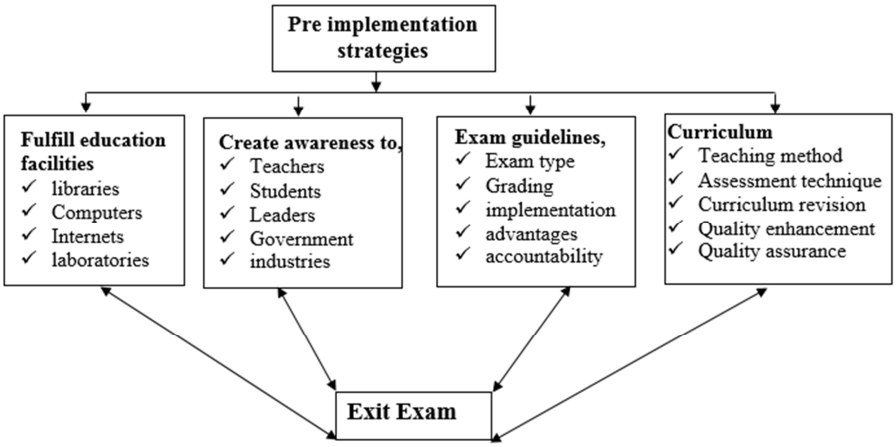

Figure 4. *Proposed Pre-implementation Exit Exam Strategies.*

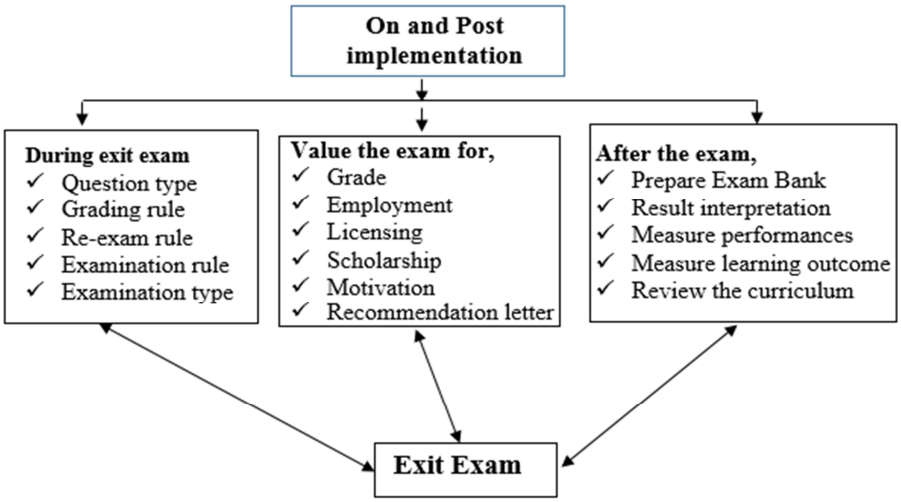

Figure 5. *Proposed pos-implementation exit exam strategies.*

7.4. Post-Implementation Strategies

After the pre-implementation strategies have been completed and a fertile academic ground has been established, an exam to evaluate undergraduate students can be conducted. Then, to address the exam's aim, academic administration guidelines must be in place both during and after the exam. From the views of students, teachers, companies, and curriculums, the following strategies shown in (Figure 5) will make the exit exam more valuable and successful.

7.5. Exit Exam Guidelines as a Curriculum

Any inquiry or cause related to exit exam strategies can be considered in the curriculum or strategies to execute and evaluate its relevance for educational quality enhancement and assurance.

What
1) is exit exam and its importance and objectives?
2) will be its challenges and limitation?
3) core courses and contents it covers?

Why
1) it is given to undergraduate students?
2) it is being at the end of graduation?
3) it is mandatory to include in the curriculum?
4) It is multiple choice exam?

How
1) The exam will be conducted?
2) It will be part of the curriculum?
3) It affects teaching and learning methods?
4) It enhances and assure quality education?
5) It increases learning and working competency?
6) It measures skill, knowledge and attitude of learners?

When
1) Will be the first exam conducted?
2) Will be re-exam will be conducted?
3) Will be the real impact of exit exam observed?

Who
1) Who will prepare the exam?
2) Will take the exam?
3) Will assess and interpret the result?
4) Is responsible, if students fail?

Where
1) Will be the exam conducted?
2) Will be re-exam conducted?
3) Will be exam significance is observed?

Which
1) Core courses are the focus of the exam?
2) Exam type is recommended?
3) Learning domain will be critically achieved?

Whom
1) For whom the exam is prepared?
2) By whom the exam the exam will prepared?

7.6. Challenges of Exit Examination

1) Persuading students about its advantages
2) Resources limitations for making the exam online at the national level
3) Administration and financial related challenges
4) Students' awareness and discontent with the exam
5) Lack of pervious national experiences
6) The presence of non-collaborative leaders and staffs
7) Difficulties in assessing the three learning domains (knowledge, skill, and attitude)
8) Rigidity and uniformity of exit exam implementation guideline for all disciplines
9) The country's educational culture and various apprehensions.

7.7. Advantages of Exit Examination

1) Increase the competition between students
2) Assess the long-term memorization and holistic quality of students
3) To assess the effectiveness of the curriculum
4) Used to assess the effectiveness of teaching and Assessment mechanism
5) Assess the quality of education among different programs and institutes
6) Qualify students for their future organizational work
7) Improve responsibility for Students, teachers, and institutions on student's outcome
8) Improve the progressive, integrated and continuous learning habits of students

7.8. Limitation of Exit Examination

1) Does not assess the skill-based performances of students
2) Increase stress on students learning
3) It may not be always perfect measure of students' quality
4) It may not be always a measure of program competency
5) Administration and financial challenge

8. Results

1) Many papers are conducted on exit exam, but an integration of exit exam with teaching and learning methods are not properly assessed.
2) Most researchers didn't indicate the specific advantages of exit exams across various disciplines
3) Researchers did not indicate the type of questions prepared during the exit exam
4) Clear national guidelines and standards are not indicated by researchers
5) Lack of awareness and motivation for students are observed in gaps
6) Prior awareness to students, academic staffs and industries are not done about exit exam

9. Conclusions

Many papers state that an exit exam is an important tool to facilitate progressive learning performance and evaluate the

overall performance at their graduating level and then increase their competency at employment and working time in their respective professions.

Research papers agree that a proper curriculum, teaching methods, assessment mechanism, and academic resources are vital to measure students' performance through exit exam.

Other research papers recommend that, the exit exam should be professionally standard, re-exam must be allowed until students will pass, the examination process should be secured, and the result should be interpreted concerning students' performance and curriculum effectiveness.

Some papers indicate that exit exams should be graded, and have value at the time of employment, scholarship, getting professional licenses, and related advantages.

Some papers indicate that creating awareness as well as accountability among students, teachers, and administrative bodies must be done to make the exit exam practical and effective.

Some other papers indicate that exit exams should be given in clusters of universities, by external examiners, a yearly exam bank should be prepared in book form, and continuous research and evaluation should be done on exit exam relevance and effectiveness.

Generally, most papers agree that it is an important assessment tool that should be included in the curriculum to increase student effort in their progressive and integrated learning competency.

10. Recommendations

To effectively and efficiently achieve the core objective of delivering exit exams to undergraduate students the following recommendation is taken into account, which is best experienced gathered from many universities in the world.

1) Build students' academic performance before Exit Exam
2) The exit exam is better to be delivered in an online system
3) Prepare Clear guidelines for pre, and post-exit exam strategies
4) Exit exams should be included in the curriculum and should be graded
5) Exit exam should be certified to get a job or professional license or scholarship opportunity
6) Its effectiveness should be assessed by research
7) Online or book-based exam banks should be prepared
8) The standard professional question should be prepared
9) Motivate top scorer students through scholarship
10) Create better and fair employment competition for qualified students
11) Improve the life standard and research-teaching capacity of teachers
12) Before an official exit exam will be given, for the purpose of demonstration implementation challenges and students preparation, mock exam should be given before 2months.
13) There must be a re-exam until the students will pass
14) It is better to make the Central exit exam or prepared in a cluster of universities
15) It is better to use both internal and external examiner
16) Attrition rate, tracer study, company feedback should be collected for those students who had taken exit exam.
17) Exit exam for engineering programs should be skill based aimed at measuring experimental, analytical, software, programing, field work, code related skills.

Author Contribution

The principal author is now working as an exit exam committee for civil engineering graduate students at Debre Tabor University, Ethiopia and has 8 years of experience in teaching, research, curriculum preparations, academic leadership position (Department Head and faculty Dean), which helps to realize the primary gaps of education quality and mechanism to fill those gaps. In this manuscript, the principal author generates the idea of the review, collect various documents, guidelines, research papers, organize and interpret ideas to achieve the review objectives. The Co-author also asses the existing challenges and opportunities to deliver exit exam at Ethiopian HEIs from various sources and share his experiences to the principal author.

Conflicts of Interest

The authors declare no conflicts of interest.

Acknowledgments

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Biography

Adal Mengesha Yimer. The author has completed BSc degree in civil and urban engineering from Hawassa University IOT, Ethiopia in 2013 and MSc degree in structural Engineering at Indian institute of technology Roorkee, IIT Roorkee, India in 2017. The Author has 8 years of teaching and research experience, preparing undergraduate and post graduate curriculum, certified in teaching pedagogy, working as civil engineering department, Dean of technology faculty.