

# ESSENCE EXAM

Testing and Assessment  
Management Solution



knowledge is power

## Introduction

Today, many educational settings have moved into e-learning. It is no longer the preserve of distance learning, it has become a mainstream teaching tool. However, interactive, comprehensive exam creation and management tools are few and far between, especially those designed for use in higher education, with tens of thousands of students and hundreds of courses.

Consequently, many universities are still working with multiple spread sheets and databases. Lecturers are still hand writing or typing exam questions that then need to be converted into the formal exam script. For exam administration departments data entry is still manual, which is time consuming, and can suffer from human error, introducing inaccuracies. In the digital age, institutions need a solution which integrates all exam work-streams and enables start to finish exam tracking.

ESSENCE EXAM is an end-to-end Exam Curation and Validation solution to help unify, automate and facilitate the assessment of students. It works for all examinations, assessments and tests that are required to pass a course – even essays. The solution provides a simple to use, comprehensive, media-rich, interactive and highly accessible environment. Because it is an intuitive, no technical knowledge is needed to use ESSENCE EXAM, and even people with basic computer skills can be up and running in no time.

ESSENCE EXAM places three values at the centre of the solution:

- Ease of use for non-technical users including exam authors
- Providing best in class accessibility, interactivity and tools
- Providing administrations with adequate answers to all of examination cycle.

## Exam Curation and Validation

There are existing solutions in the marketplace offering exams management, and others offering exam script creation and marking (although most are aimed at schools). But only ESSENCE EXAM brings these two work-streams and others together – we call this Exam Curation. ESSENCE EXAM also offers the advanced reporting and dashboards that are the hallmark of a modern, cutting edge, interactive solution. This is Exam Validation.



Exam Curation is about bringing together all the exam 'objects' in one place, managing and overseeing them. This includes:

- Creating and managing examination papers and content (paper based and online).
- Managing the administration of the examination process
- Marking and results



Exam Validation is about oversight. Simplifying and automatically enabling accurate, real-time reporting, ensuring the relevant processes are tracked, and monitoring student progress.

- ⦿ Automatically ensuring the correct procedures are followed.
- ⦿ Reviewing and inspecting the entire examination process.
- ⦿ Reviewing the performance and progress of individual students or a course.
- ⦿ Reporting on absentees, late submissions, grades etc.

## ESSENCE EXAM Features

There are 9 main elements to the solution.

### 1. Exam Administration Operations Features

This element is designed to be used by those who traditionally manage and administer the examination operation. ESSENCE EXAM enables the following both online and offline:

- ⦿ Appointment of examiners, assessors and invigilators
- ⦿ Assignment of rooms and halls.
- ⦿ Administering examination entries
- ⦿ The submission of assessments
- ⦿ Examination timetables and alternative arrangements
- ⦿ Recording examination results
- ⦿ Applications for alternative arrangements and factors affecting performance
- ⦿ Late submissions of assessments/essays
- ⦿ Support for exams, script and submission archive
- ⦿ Mock exams
- ⦿ Communication tools like messaging systems and email interaction
- ⦿ Distributing exam scripts – both paper-based and online



## 2. Instructor Operations Features

This is the part of the examination process traditionally undertaken by lecturers/tutors. With ESSENCE EXAM it is a simple process to:

- Inform the operational team of the schedule for each stage of the course assessment process (triggering assessment operations)
- Create the examination/test/assessment
- Mark the examination/test/assessment
- Submit the exam script to the administrative team
- Review the progress of individuals and groups
- Format of the examination/test/assessment
- Decide on the delivery system for the exam – online/paper based etc.
- Time allocation
- Maintain the examination/test/assessment (past papers, question re-use, ensuring new papers are of a suitable standard in relation to previous years' papers)

## 3. Student Gateway Features

This element is about providing students with online access to examination information

- Access to timetables
- Receipt of automatic reminders
- Access to e-exams
- Access to grades

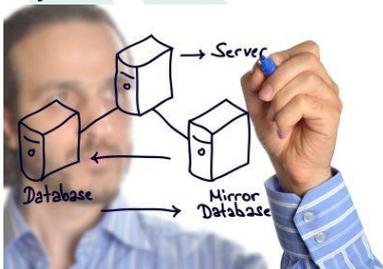


## 4. Security

ESSENCE EXAM- A three layers architecture, has multi-level security, data encryption and the option for finger print access. Only designated users can access examination papers and the question banks, and the administration modules. Permissions are granted to only the individual modules a user needs to access, and this access is password protected.

## 5. Administration

The IT database administrator (DBA) is the technical administrator of the database. They oversee the performance, integrity, maintenance and security of ESSENCE EXAM database, as well as troubleshooting any IT issues that arise for users.



The ESSENCE EXAM administrators are the people responsible for overseeing the data in ESSENCE EXAM. They will setup new users and delete existing ones, assign or change user permissions. They will be responsible for keeping the exam room/halls, invigilators list, etc. up-to-date. They may also act as the help desk. There can be one designated administrator or several. ESSENCE EXAM does not have a separate administration module, instead users are assigned permissions to

undertake the relevant actions.

## 6. Multi-Language

ESSENCE EXAM is available across all languages. Institutions simply need to specify the languages they require, and the software will be supplied in these languages, with the ability for one user to switch between different languages seamlessly.

## 7. Item Response Theory



ESSENCE EXAM has the ability to create adaptive exams/test/assessments based on IRT theory, offering the chance to accurately assess individual student ability. The tutor/lecturer creates the IRT-based exam questions using ESSENCE EXAM in-built IRT feature. When the exam is taken, based on a student's previous answers, the exam will automatically adapt, offering the next logical IRT question. Once completed, ESSENCE EXAM automatically marks the exam, based on the parameters entered

by the tutor/lecturer.

## 8. Customization

ESSENCE EXAM can be customized to meet an institution's needs. For example, ESSENCE EXAM menu can be adapted to use the terminology required by an individual university. The ESSENCE EXAM interface is also displayed with the institutions logo in all modules. Further customizations can be discussed with TDM systems, during the procurement process.

## 9. OCR/OMR

ESSENCE EXAM has the ability to use OCR/OMR (Optical Character/Mark Recognition) to scan completed examination papers. It also offers Optical Mark Recognition (OMR), for the automatic marking of paper-based, multiple choice question test and exams.

## Advantages

- Existing multiple systems are integrated into a single database
- Works with a University's existing IT infrastructure
- Easy to train users
- Both students and staff can access information on multiple devices – laptops, phones, tablets
- Regular technical updates from TDM Systems
- Time saving
- Identifies exam clashes and produces an optimal, individual exam timetable
- Real Time data-Dashboard

## Examples of how ESSENCE EXAM works

### How ESSENCE EXAM creates examination, test and assessment papers

Once a tutor has been assigned the relevant permissions by the ESSENCE EXAM Administrator, they can begin the process of creating the paper.

Using the XXX option from the menu, they select a predefined template – which include Multiple Choice

- Yes/No
- Multiple Answer
- Fill in the blank
- Hand Writing
- Text
- Matching
- Paragraph
- Image Compare



They will then begin to add their questions. These can be input manually, if it is the first time they have used the system, or chosen from their Question Bank. All new questions that are added to ESSENCE EXAM will be saved in the Question Bank, ready for future re-use. The Tutor can also add:

- Video files
- Audio files
- Scientific editor
- Requests for attachments



ESSENCE EXAM includes the ability to type longer handwritten exams and essays directly into ESSENCE EXAM for manual marking.

The tutor can then decide if they would like a static or dynamic exam script. A static script shows all the questions in the order in which the tutor has entered them. A dynamic script is a randomized paper. This feature is specifically designed for e-exams. When the student logs into the examination, the questions

and answers can be randomized by ESSENCE EXAM so no two students see the questions in the same order. This is designed to cut down on cheating and misconduct by students.

### How ESSENCE EXAM marks papers

The tutor will use ESSENCE EXAM to define grading rules by which the completed exam script can be marked. Once a student completes the e-exam, the script is then processed by ESSENCE EXAM using the rules and then the grade is automatically assigned. This works for all types of test/assessments/exams except essay questions, which needed to be graded by the tutor through his computer. However, the tutor has the option to record the grade within ESSENCE EXAM, so overall student progress can be assessed.



### How ESSENCE EXAM produces paper-based exams

Not every institution has the facility to accommodate e-exams, often due to network restrictions or student access to a suitable device. After the tutor completes and submits an exam script to the administrative team, a paper-based examination can be produced. The printed examination is distributed to the appropriate hall and invigilator and recorded in ESSENCE EXAM. Once the papers are collected, the scripts are uploaded into ESSENCE EXAM using Optical Character Recognition (OCR) or Optical Mark Recognition (OMR).

### How ESSENCE EXAM manages the administration of exams.

#### Setup

Initially, the ESSENCE EXAM administrator will input the details of the exam halls/rooms. Where a University has multiple campuses – either within the same city or in different cities, examination halls and rooms are assigned to that location. This means that students will only attend examinations on the campus they attend.

The team will also input the details of all the invigilators that are available, and which campuses they are assigned to.

These lists are now permanently available for use in ESSENCE EXAM, and can be updated as and when necessary.

#### Exam administration activities

The exam administration team will input the assessment schedule for the individual courses. For example, a course held in the Summer Term may have a test in the third week of the course, an essay in the sixth week of the course, and an exam during the end of year examinations. This information will be recorded in ESSENCE EXAM. These schedules are updated yearly.



Based on the information ESSENCE EXAM would then automatically allocate an exam rooms/halls for the all scheduled tests and the examinations, and assign invigilators. The clever thing is that ESSENCE EXAM compares all the assessment schedules of all courses that have assessments in the same period, and ensures each course gets a slot, removing conflicts and double bookings. If for an individual student there remains a conflict, the admin team can make alternative arrangements for the student concerned, as is standard in these situations.

ESSENCE EXAM then assigns a seat in the examination hall for each student, and creates an individual examination timetable for every student. This could be for a single mid-term assessment or for multiple end of year examinations etc.

#### After the examination

Once the examinations are completed, the results will be recorded (automatically for any ESSENCE EXAM marked scripts). ESSENCE EXAM offers a number of reporting features to review examination operations – for example, absentee reports.

## The complete ESSENCE EXAM process for an examination

This is a simplified overview of how ESSENCE EXAM administers a formal examination. Many of the processes will run in parallel.

- 1 •The administrative office is informed of the assessment schedule for each course by the individual academic departments.
- 2 •Details are loaded into TAMS
- 3 •Examination rooms are booked from the TAMS list of available rooms/halls
- 4 •Invigilators are assigned from the TAMS list of available invigilators
- 5 •The exam timetables are produced by TAMS
- 6 •The exam timetables are sent automatically to students
- 7 •The lecturer/tutor creates the exam paper in TAMS
- 8 •All questions are automatically added to the lecturer/tutor's unique question bank
- 9 •Lecturer/tutor submits the completed examination paper to TAMS
- 10 •The paper is prepared as either a TAMS e-exam or exported as a paper-based examination
- 11 •Paper-based exams are printed from TAMS
- 12 •Reminders are sent to students
- 13 •If necessary, delivery of the papers to invigilators is recorded
- 14 •The exam is held according to the timetable
- 15 •The list of attendees is recorded in TAMS
- 16 •Collection of papers is recorded in TAMS
- 17 •Papers are submitted for TAMS automatic marking or for manual marking
- 18 •Marks are recorded automatically (when auto-marked) or input manually in TAMS
- 19 •Dashboards are produced in TAMS
- 20 •TAMS informs the students of their results
- 21 •Administrative reports are produced throughout the process
- 22 •Tutors can view the progress of all group members or individual course members

## Modules

### Main Modules:

- 1 •Variables: Hall, Filters, Cities, Courses, classes .
- 2 •Users: Administrative, Instructors, Examinees, User Access Matrix and log File.
- 3 •Hall Management and Reservation.
- 4 •Examinees Distribution.
- 5 •Question Bank.
- 6 •OCR/OMR.
- 7 •Finger Print.
- 8 •Dash Board and Reports .
- 9 •eExams.
- 10 •Surveys.
- 11 •Auto schedules and Committees.
- 12 •Scientific Editor.

## Technical Details

### How does ESSENCE EXAM work?

#### On-premises

- ESSENCE EXAM is a backend resides on either a Windows Server or a Linux Server.
- Users can access it via Windows, Linux, IOS or Android device and it is Mobile Ready.
- The ESSENCE EXAM database connects the user devices using internal/External IT infrastructure, including the wireless network.
- There are a number of database and user security measures in place, which complement the existing IT security measures.

#### Cloud-based

- The ESSENCE EXAM can also be hosted in the Cloud, on services like AWS, Rackspace and Google.
- These services a very secure, and work with the ESSENCE EXAM security measures.
- Users can access it via Windows, Linux, IOS or Android device and it is Mobile Ready.

Instead of connecting a database server within IT facility, which is located locally, the user connects to ESSENCE EXAM via the Internet. This works in the same way as using Gmail or Dropbox.

## Technical Specification

- 3 Tier Architecture.
- Module Based Structure Hierarchy.
- 2 Way MVC.

#### Technology:

HTML5, AngularJS, Bootstrap, NodeJS, CSS3, PHP, MySQL, Code Hive Framework, MVC5, API & Web Services, Web Kit , Polymer Web Components.

#### Platform:

Server Side: Windows Server, Linux  
User Side: Windows, Linux,iOS, Android  
Mobile Ready

#### Security.

User Level: Resolver, Method based, Router Based, API Based, and Private Browser.  
Transmission: SSL.  
Database: Local Access Only.  
Optional: Finger Print authentication.

<sup>i</sup> **Curation** is about managing and presenting large quantities of information it in a meaningful and organized way around examinations processes. It is based on the concept of Content Curation.