

Analytical Framework for Monitoring Teaching - Learning Process

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Introduction

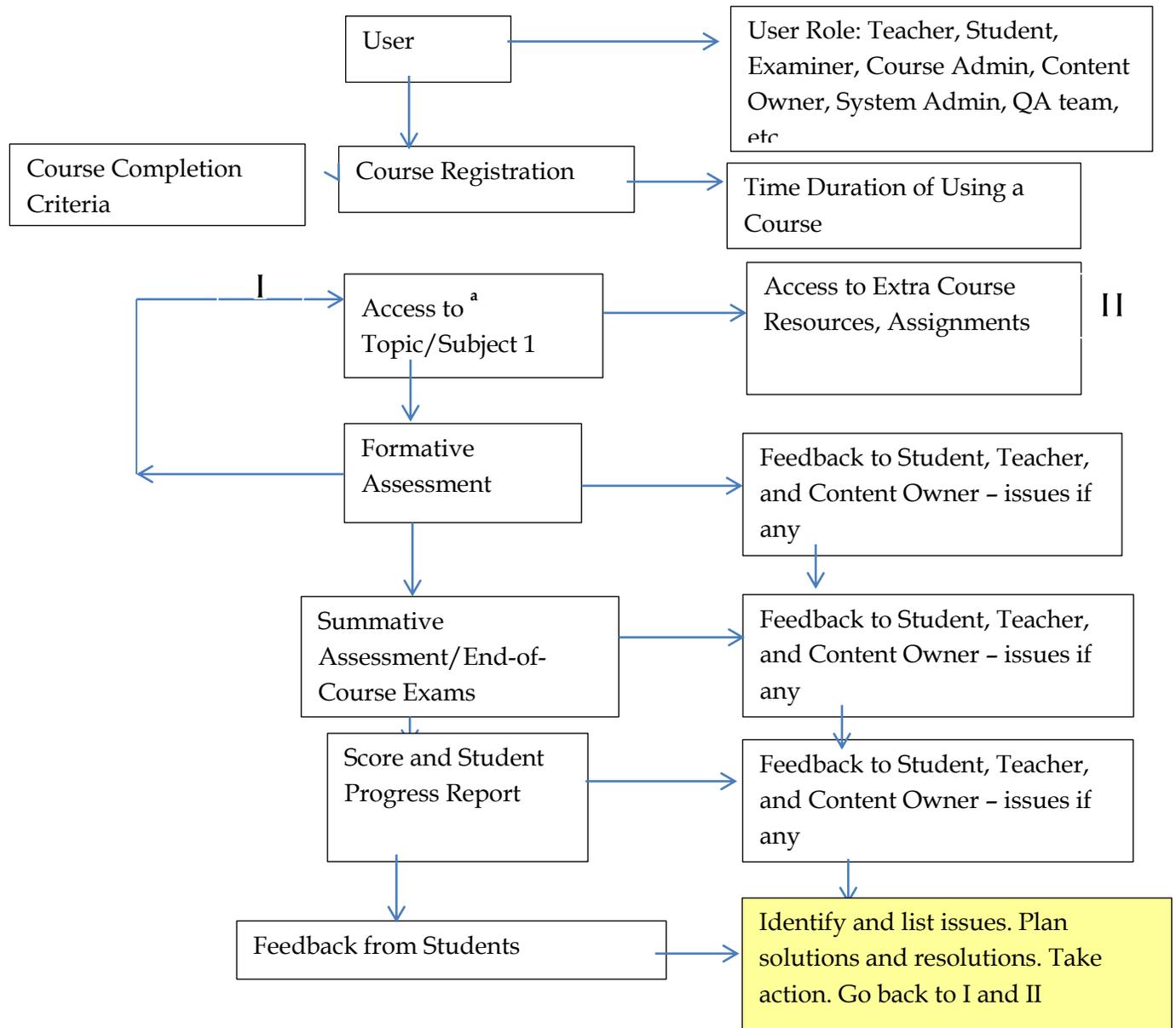
The use of any learning analytics and its framework is important because it gives us a powerful tool for monitoring teaching-learning process, especially in an on-line learning environment. The demands of skilling millions to be job worthy, quickly and easily, is truly an enormous task; and only by automating and capturing the teaching-learning process will all stakeholders be able monitor what is going on!

An analytical framework is a statistical method to measure set criteria and scope of the business of teaching-learning, that is academic delivery to end-users. The use of an analytical framework is generally for all stake holders. It is a visual way of linking concepts and assumptions taken at the beginning of a process, with evidences of results. When such a framework is applied during a mid-course, it helps to garner logical flaws in the systems and processes, so that corrective steps may be taken. It is a sort of a feedback to all stake holders regarding what is occurring in the system. In addition, any analytical framework can also provide quality assurance in education, and a way to measure return on investments (or return on expectations) in education.

A Sample Flow Chart

The following gives a sample (schematic) flow chart of how a course or a subject delivered, and what are the nodes for monitoring. From here a list of variables can be identified by person responsible, which can go into the analytical framework.

(A list of variables is included in the next section.)



^a The same loop and flow can occur for other topics/subjects that may comprise a whole course.

Teaching-Learning Process

In the flow chart, a box has been coloured:

There will be important questions that will flow out of this box and should reflect in the analytical framework. These questions could be:

- Is teaching occurring?
- Is learning happening?
- Do the test/exam score reflect anything about the process of teaching-learning?
- How is content delivered? Which across various modes (video, WLC, eLearning, etc.) is better assimilated by students?

How are these issues to be resolved? Here are some possible solutions:

- Create rubrics that map learning objectives to learning outcomes (which will embed an assessment matrix too). These need to be weighted, depending on the curriculum topic weights.
- Learning outcomes can be assessed by formative/summative assessments
- Monitor time spent by students/teachers on each topic/subject, time spent in accessing resources.
- There could be a difference in assimilation across various content modes, across various user groups, etc. These can be programmed to monitor too.

List of Variables in an Analytical Framework

A possible list of variables that may be monitored in an analytical framework given below:

1. Who using the course work, and their roles
2. Course/subject attendance, and time duration
3. How many assignments have been submitted?
4. How many attempts to pass an assessment
5. Time spent completing a subject/course
6. Are there any instructional issues from analysis of student feedback + scores
7. Do students like a particular form of content, for example, video lectures?
8. Have all course completion criteria been met? If yes, then issue of a course completion certificate? Allow further courses?
9. What does an automated analysis report indicate? Has it changed with time?
10. How many times a content/curriculum needed to be upgraded to meet learning objectives/outcomes

Dashboards

Dashboards can give a visual representation of how teaching-learning process is occurring. It is an important part of any analytical framework. Each stakeholder can have their own dashboards.

A student's dashboard for a particular course/subject may capture the following variables:

- Date wise time spent on the course
- Date wise assignments submitted
- Formative Assessment – Date taken, no. of attempts, scores
- Summative Assessment: Date taken, score
- Feedbacks given
- Date wise time spent with an coach/tutor/lectures

A teacher's or course owner's dashboard for a particular course may capture the following variables:

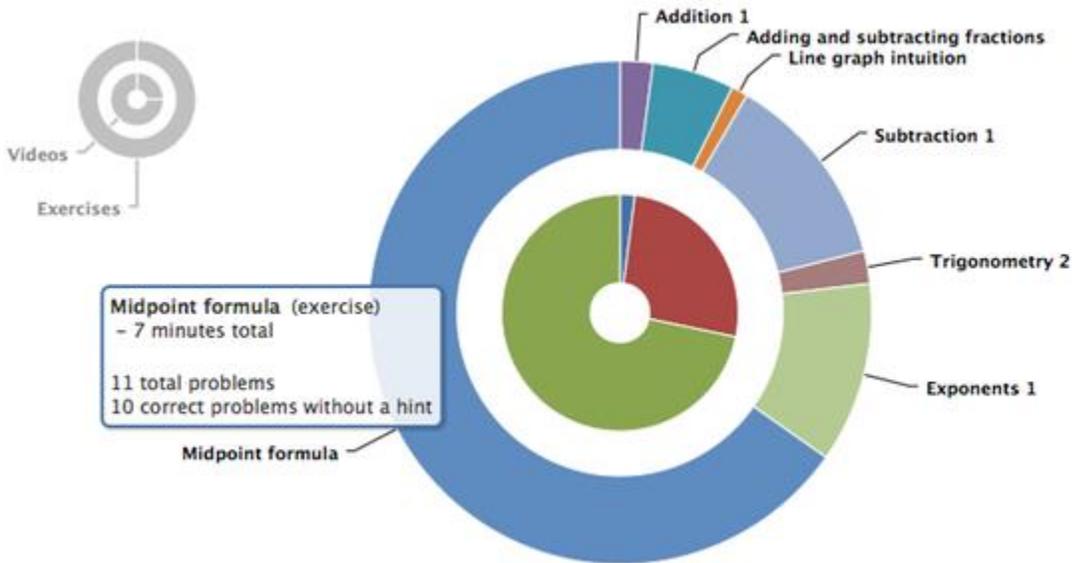
- Number of students registered for a course
- Date wise time spent on the course by each student (can be made more granular if required)
- Date wise assignments submitted by each student
- Which mode of content is preferred by the students?
- Assessments: Date taken, score by each student, is there any improvement?
- Have learning objectives/outcomes been met?
- Date and time wise live coaching/lectures to students
- Student report card
- Student feedbacks and actions taken. Has this changed with time?

An Admin's dashboard may capture (role-wise) the following variables:

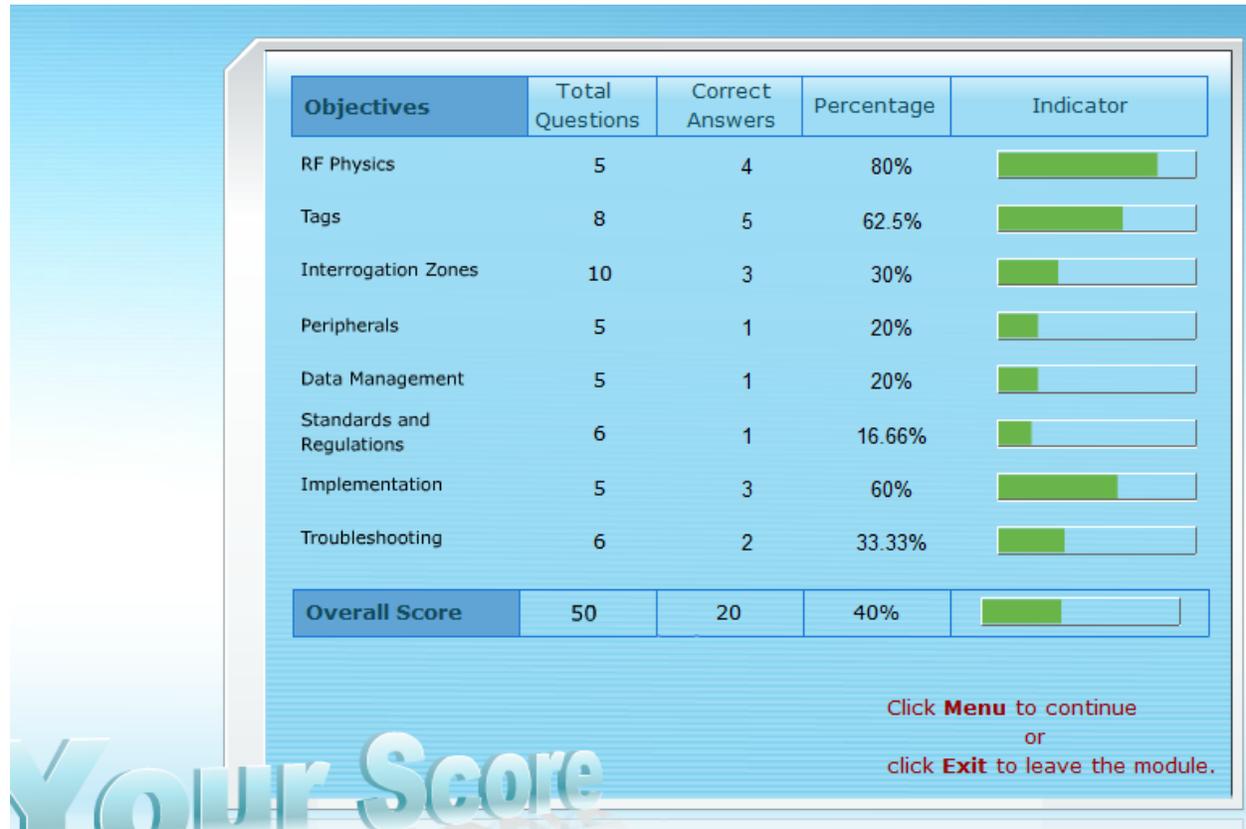
- Course or subject titles
- Number of teachers teaching each course/subject
- Number of students registered for a course/subject
- List of course and content owners
- Date and time wise website traffic
- Which mode of content is preferred by the students?
- Number of requests for lectures/coaching, etc. Reasons for the same.
- Date wise feedback analysis reports, has it improved with time?
- Monitor performance of teachers, have they managed to deliver the course objectives?
- Monitor performance of students, have they fulfilled course completion criteria? If yes, then issue of a course completion certificate? Should they be allowed further courses?

Sample Dashboards

(a) From Khan Academy Website



(b) From TIS course on RFID



Quality Assurance in Education

To provide assurance to all stakeholders (mainly parents, students, course owners, principles, top management, etc.) regarding quality of education, it is best to address by monitoring every aspect of the learning steps, which is what we can do for on-line education. For this we will need the analytical framework discussed before.

It has to be noted that solutions for assurances are water tight - some solutions work for some, some other solutions work for others! Learning is a very individual journey; all that sincere teachers and educators can do is to provide the right environment and motivation so that a learner can take that journey, and enable a learner to progress, and acquire better skills and competencies in their chosen line or profession.

Below is what I would like suggest for quality assurance in education:

1. Teachers should provide extensive and detailed templates to map objectives of the course work to the learning outcomes. The mapping has to encompass subject level outcomes along with broad programme level outcomes.
2. Students should have adequate hands-on work, project work; challenge them with problem-based learning, and enquiry-based learning; also give them time for self-study and home assignments.
3. For college students, allow a gap year so that they can take industry experience and 'learn' something in the real world rather than in the enclosed campuses, class rooms, libraries, computer rooms and labs!

If these are strictly followed, I can guarantee that the quality of education will improve. It will provide an absolute transparency to how teaching-learning is being imparted.

The return on investment on education will pay off sooner than later.

Of course all this means a lot of hard work for teachers and students (and also for the management of educational institutions). Getting quality education is NOT an easy task! Good quality education is cost and effort intensive, there is no second option.

Return on Investment or Return on Expectations

The Ed-Tech environment is definitely improving the quality of education, especially in the higher education sector.

But any change in a system is expensive; introducing educational technology in traditional learning methodologies is definitely cost and effort intensive. But this has to be done now, because learners these days are different, their preferences have changed,

and they have the option to shop around for what suits them in the plethora of course options.

Many have argued that the structure of an educational institution, be it school, college or university, must undergo a paradigm shift from the instruction delivery to learning opportunities. In the new scheme, each faculty becomes designer of learning content and maintaining a learner-centered environment. Curriculum design is based on an analysis of what a student needs to know to function in a complex world which can be re-designed and offered on needs basis.

Now comes the cost.

Since it is difficult to measure the usefulness of acquiring some education, we judge the 'goodness' of the monies spent by getting high marks, passing some exams, and getting into renowned colleges or obtaining a great job. The gratification on the monies spent occurs many many years later - it is unlike buying a soap or a pizza! Therefore, the ROI is hard to measure in the short term. Getting any formal education is a long, lonely and almost a personal journey, and if the journey does not end with a meaningful and fulfilling job and life, it is a meaningless journey!

I suggest that instead of measuring ROI, we should propose to measure ROE - a return on expectations, since expectations from a course curriculum can be promised, and measured using various assessment techniques. ROI for investors and learners will be different, but ROE can be the same for all concerned, and that would be a good metric to start with, is it not?

Conclusion

The main focus of any analytical framework is to guarantee quality assurance in education. We need to create rubrics, to map the learning, and create assessment matrix to capture all predetermined metrics, automatically. All the variables and parameters may be captured and displayed in a dashboard, to enable all stakeholders to gauge the teaching-learning process. Then, and only then, can we be transparent, and give assurances regarding teaching-learning, and provide return on expectations in education.