# USE OF PORTFOLIO ASSESSMENT IN TEACHING OF SCIENCE

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Assessment is imperative in the teaching-learning process. The effect and efficiency of an educational endeavour rests on appropriate assessment. An effective assessment looks into whether or not the objectives of the learning process have been fulfilled. Assessment of the teaching-learning process is thus, in essence, a key into understanding not only the students' potential and gauge the increment in the knowledge base, but can also be used to identify the factors which may enhance learning in a classroom environment. This paper looks at portfolio assessment in the context of a science classroom.

## Teaching of Sciences

### Objectives of Education

Education can be seen as a tool to understand the world we live in. While seeking to educate in classrooms, a teacher invariably begins by formulating certain pre-determined objectives. These might be in the form of scholastic objectives: seeking to enhance the students' know-how; or it may also be in the form of setting of certain acceptable moral, social and behavioural life lessons for the young learners. An academic year, thus, in many ways reflects its fiscal counterpart. The education provider, at the end of the 'term', seeks to determine the return on 'investment', the investment pertaining to the hours, effort and principles directed to engage the pupil in the learning environment. Assessment is thus a record of this return on investment, for an academic setting. As can be expected, the assessment should provide a holistic view of the efficiency and effect of the educational practices. As with any measurement, the dimensions of the depth and degree of accuracy in understanding the system and performance, would rely on the tool used for the same. Portfolio assessment comes in play in this regard by providing a special, all encompassing, dynamic mapping tool for the learning process. With the aid of portfolio assessment, we can envision a better understanding of not only whether or not objectives for a certain educational pursuit were achieved, but also, how effective the achievement has been for the individual learner and how efficiently can it be modified to cater to the entire classroom for a better performance.

### A Peep into the 'Science Classroom'

The study of science, whether for life, technology or society, is the study for understanding, appreciating and creating awareness. Science learning relates to developing sensitivity in the child while relating with the environment. It is developing 'awareness' in the child. It is apt then that 'Scientia', in essence, is derived from the Latin word for 'knowledge'. A demarcation of classrooms as 'science-stream' or 'non-science-stream' can be considered a tad

Neanderthal as an attempt at segregation. For any classroom, by virtue of it being a learner's haven, is dealing in essence with a cycle of creation, assimilation and dispersion of 'knowledge' or 'science'. Thus, a student of social sciences, say one who dwells with history, is in effect engaging in an activity which would draw semblance with a student who is learning about single-celled organisms. However, for the purpose of elaborating upon the merits of the portfolio assessment on a particular closed set, one could distinguish a science classroom, it its traditional sense and highlight upon the benefits, as pertaining to the same.

So what is assessment? In traditional terms, one can view assessment as the 'end' score evaluation at the completion of a cycle. In schools, we have tests: unit tests, class tests, mock tests, mid-term tests and the list go on.

Thus, each test marks the end of an important chapter, in the student's book of learning. But, what do each of the assessments seek to measure? Are we measuring the learner's knowledge base or the potential to learn? Are we monitoring the learner's comfort ability in grasping of concepts or are we measuring whether or not the learner has grasped? Are we binary in our pass/fail decision making procedure or do we allow for the gray to reason with the white and choose a side. Are we seeking to understand whether the child can rote learn facts and figures in an evening and produce them the morning after, or are we trying to gauge if the child understands the approach and is brave enough to reason with it and challenge it, if necessary? Are we trying to understand how many person-hours the teacher spent in explaining a concept, or are we trying to look at how well the teacher taught a concept given a time frame? True assessment is subjective, given the boundaries, defined by: who? why? when? what? and how? we want to assess a scenario with regards to.

In understanding portfolio assessment with regards to science education, one can relate it to the quintessential scientific 'job', of that of a doctor. A portfolio assessment can be seen, in essence as an account about this particular doctor, from a close friend and colleague. It is an evolving, somewhat subjective, opinion about the doctor, from his days as a freshman pursuing his MBBS continuing to the day he performs his first open heart surgery, the day he loses his first patient through to the present. It is a dynamic conversation which deals with inputs on the person's learning path, through the individual crests and troughs that may be added to the curve, as a result of personal experiences.

## Constructing Education and Identifying the Need for Relevant Assessment

As has been discussed, scientific training is not about teaching an individual the facts and figures, it is in fact to engage the pupil to be interested enough, to search for the aforementioned data and then reason the numbers and trends. The 21st century educators have been imparted with the task to create learners, who are willing to seek the truth, at the cost of 'unlearning' previous hypotheses, given enough reason and facts.

*"You can define a straight line; what use is that to you if you've no idea what straightness means in life?"*

— *Seneca, Letters from A Stoic*

While new discoveries abound and previous norms are challenged on a regular basis, a learner has to be equipped with the tools to take well-informed decisions based on evidences. A 'scientific temperament' in this regard, would

be to view the happenings in the world as experiments and formulate hypotheses based on existing knowledge based assumptions. Then, building upon the hypotheses, until the explanations gain coherence.

In such a dynamic teaching-learning universe, there needs to be an assessment tool which is adaptive, intuitive and ever evolving. An assessment system, which enlists the learner's capabilities and capacities and builds upon it, is thus an excellent approach to evaluation of both teaching and learning. The portfolio assessment is a tool which seeks to do just that.

## Portfolio Assessment: A Viability

*"Most learning is not the result of instruction. It is rather the result of unhampered participation in a meaningful setting. Most people learn best by being 'with it,' yet school makes them identify their personal, cognitive growth with elaborate planning and manipulation."*

*— Ivan Illich*

Assessment can be traditionally summed as being formative or summative in nature. While the former answers the assessment for learning, the latter caters to assessment of learning. Portfolio assessment can be seen to be as an intermediate of the two, given that it sums up the performance of the student in the classroom, and qualifies the student for the next, but also gives an idea of the process of formation of the knowledge base.

In portfolio assessment, the learner is given ownership of the learning process. Thus, the individual is empowered, given that she/he can seek to tackle problem-based questions and form a deeper understanding of a concept, rather than merely understanding utilisation of a tool to some day tackle a real world problem. Portfolio assessment can also be seen as a dialogue between the learner and the facilitator or the teacher. The learner engages in dealing with a problem and imparts to it personal approaches, based on an existing knowledge base, the facilitator then seeks to build upon this base by giving inputs and feedback to the learner, based on her/his attempts to arrive at a solution. The learner, in this entire process, creates a portfolio of collected evidences of learning, all the tasks which she/he had to undergo to finally make a decision, and also documenting 'how, when, why and where' those decisions were arrived at. These documentations are also supported by the artifacts that may have been created in the process of learning. This type of an assessment methodology gives insight into the students' exercise of mental facilities, it can seek to educate the facilitator on the weak points and strong points of the pupil, so that both may seek to efficiently and effectively learn.

## Conclusions: Portfolio Assessment, Utopia versus Practicable Reality

Portfolio assessment, while it can be a boon in the teaching-learning system, comes with its fair share of banes. The subjectivity of the assessment, in a competitive educational 'market' wherein grades make or break career decisions and life choices, can be a factor too overwhelming, to quite ignore. A teacher can mould the learner in the direction she/he wants. A student engaged in learning from a mediocre teacher, would then not truly benefit from this system at all.

The second-most noteworthy critique of the portfolio assessment is the resource allocation for assessment. In a developing nation, such

as India, do we really have the wherewithal to cater to creating, maintain and giving individually catered feedback in our 'brimming to the full' classrooms? Would that not be a plea to teachers who in fact perform sub-optimally? Are we equipped with education for the educators to individually respond and provide dialogue in a portfolio based system? If not, can we afford to provide it to all our educators? The third concern that portfolio assessment raises is that of student mobility. This may be seen as an extended case of subjectivity versus objectivity in assessment. If a student transfers mid-way through her/his learning, would a variation in the personality of the portfolio assessors provide hindrance to the learning graph of the child?

It may thus be concluded, that as an assessment tool, portfolio assessment may be adopted to successfully gauge the student potential and commitment to learning of sciences. However, it would be better to view portfolio assessment as not only an evaluative measurement indice, but an education tool to formulate a dialogue and discussion based teaching-learning environment in the classrooms of the 21st century.

As is said about the success of every tool, it is not solely the tool but the one wielding it, who contributes to a successful and intelligent measurement. The impetus, as always, lies with the educator.

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