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Dealing With Challenges in Teaching Decision Sciences

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ABSTRACT

The umbrella of decision sciences shelters applied mathematical areas such as optimization, and statistics, which helps in decision making in almost every field. Be it of managerial decision making for manufacturing or service industries, engineering, financial services, medical, psychological studies or any other aspect where there decision maker has an option to choose from alternatives available or make inferences on the basis of data, the role of decision scientist is inevitable. Although in different areas, terminology differs but the basics of decision sciences remains the same. Teaching decision sciences has always been a challenging task due to many factors, primarily the student's phobia of mathematical subjects. Plethora of time, effort, patience and more importantly passion is required in preparing each class in an organized way. To present the complex mathematical concepts in cool understandable steps, to widen student's interest by showcasing them applications of the same in their area of study, the part of instructor becomes very imperative. This paper discusses issues in teaching decision sciences, innovations in teaching pedagogy, and alternative assessment methods to create an enhanced learning environment. An attempt has been made to motivate the educator to focus their energy more on how to deliver the knowledge in a rhythmic pace to vastly improve student's experience.

Keywords: *Decision Science; Teaching Pedagogy; Enhanced Learning; Effective Educational Practices; Technological Tools.*

1.0 Introduction

By and large, there is a lack of awareness among students, parents and even the academicians about the wide scope of this discipline. Often seen in many institutes these subjects are considered as preliminary courses to be taught in early semesters of their curriculum. Having roots in the complex mathematical ground, these courses are often taken as dry subjects, requiring more efforts in learning, good amount of practice time and contextual mathematical familiarity. An interactive procedure should be used by the educators/ professors to stimulate the student's interest by showcasing practical implications of these subjects in order to pact with inconsistencies between the actuality and common belief. To assimilate the change in the culture of academic community, faculty's participation is essential. While discussing teaching efficacy two features must be addressed, namely, content, and delivery. With experience and hard-work, faculty can acquire knowledge and attain expertise in a particular course. Nonetheless, to transfer this knowledge in students with different intensities is even more challenging, particularly for mathematical courses. It requires unceasing enthusiasm and learn-ability to improve the way of lecture delivery, more importantly the willingness to improve. So there is utmost urgency to deal with the issues in teaching decision sciences and implicate thoughtful reform efforts to undertake the challenge. Bearing in mind, the need to contrasts the model of the traditional educational environment with that of a professional learning community, an effort has been made to debate challenges and some way-outs in teaching decision sciences.

2.0 LECTURE REVIEW

Jackson and Davis [1] attempted to improve middle grades education and to educate researchers and practitioners in his book Turning Points 2000: Educating Adolescents in the 21st Century. They emphasized that in addition to structural changes in

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the classroom and institutes, educators must also make considerable, wide-ranging modifications in curriculum, student evaluation, and instructional pedagogy to improve student's learning experience. Nooriafshar and Romero [2] discussed the use of technology aided teaching for improving learning. Sadler [3] pointed out the role of teacher's self-confidence as a key influencing factor for better student's involvement. Li [4] proposed a PDCA (plan-do-act-check) model aiming enriched teaching quality. He analysed specific reasons for poor student's performance in operations management and suggested improvement methods for the same. Umbach and Wawrzynski [5] emphasized in their study that improved learning and higher student's engagement is achieved by active faculty members in using collaborative learning techniques, higher-order intellectual activities in the classroom and elevating academic involvements.

3.0 Role of Educator in Enhancing Student's Knowledge Achievement

Teachers affect eternity; no one can tell where their influence stops [6]. A philosophy of enhanced learning community can be characterized by an environment fostering mutual cooperation, personal growth, emotional support, and a synergy of efforts as states by Du Four and Robert [7]. An educator's roll is the central for creating such an environment. Umbach and Wawrzynski [5] proved statistically that faculty behaviours and attitudes affect students deeply, suggesting that faculty members may play the single-most important role in student learning. As faculty play a vital constituent of the student's institutional experience, institutes need to find new ways to support and recompense them in their role of teaching.

No one size fits all. In a professional degree class, there is a tremendous diversity among student's academic background, level of understanding, approach of problem solving, and even language in which he/she is comfortable. By sharing the knowledge and interacting with students, faculty can know them better and consequently alter technique of lecture delivery.

Practice has proved that the stronger the teachers' innovation sense and creative thinking, the more will be their motivation to pursue innovation and, then, promote the understanding of the nature and status of this course and grasp the teaching situation more accurately [4].

Whether or not they realize it, students have the freedom to explore and to think about problems in new ways. Faculty can give a direction to their accepted wisdoms and inquisitiveness. Another desired aspect of teaching is in working with students individually as an advisor. To offer basic concepts, technical suggestions and ideas as well as helping them to be able to relate their learning to real world.

As to the teaching effect, purely theoretical teaching cannot stimulate students' interest in learning, and there will not be a constructive interface between teaching and learning according to Christensen and Carlile [8]. Obviously, specific procedure to handle mathematical proofs and methods could lead to an increase in mental as well as computational load, efforts should be made to cultivate mathematical thinking and problem solving skills in the students. Once understood the concepts well, students should be able to apply those mathematical model for real life problems. Again, the faculty can help them to think beyond in-print academic understanding of theories and ripen imaginative thinking in them, lot of patience and persistence required from faculties while attempting change.

4.0 The Umbrella of Decision Sciences:

As defined by the Institute for Operations Research and the Management Sciences on its website [9], decision science is a discipline which deals with the application of advanced analytical methods to help make better decisions. It is often considered to be a sub-field of mathematics (AMS mathematics subject classification 2012). But because of its emphasis on human-technology interaction and because of its focus on practical applications, decision science has overlap with other disciplines, particularly operations management, industrial engineering, economics, computer science and draws on psychology and organization science, no area going to be untouched.

Employing techniques from applied mathematical sciences, such as mathematical modeling, statistical analysis, and mathematical optimization, decision science identifies the values,

uncertainties and other issues relevant in a given decision, its rationality, and arrives at optimal or near-optimal solutions to complex decision-making problems.

5.0 Issues in Teaching Decision Sciences

Decision science often known as Operations research is an interdisciplinary mathematical science that emphases on operative use of technological tools [10]. It is an important applied foundation course. While existing teaching pattern in our higher education rely predominantly on teaching of concepts, derivation of mathematical results, and it lacks mathematical modelling methods, analysing and solving operations research problems of practical purpose, and effective use of relevant software and programming tools for complex problems.

There are certain issues which make it difficult for educators to efficiently teach decision science and other mathematical courses. The most commonly observed issues in Indian context/perspective are as follows:

5.1 Curriculum

The very first issue for providing a better practical learning in any particular course is how the curriculum is addressed in view of different degree courses. In many institutes, syllabus is not updated regularly, does not contain topics drawn from present business practices. Newly emerging universities generally prepare their course structure by replicating the existing syllabus for similar courses without putting enough efforts to thoroughly research the learning objectives for the particular course. Usually, most of the faculties have not had the industrial experience; they lack the perpetual recognition of professional manoeuvres.

5.2. Approach for teaching same course at different levels.

Operations research and statistics are the courses which are offered in almost every professional course, e. g., B Com, BBA, MBA, B Tech, BSC, MSC, Charted Accountancy, Bio Tech, etc. As demanded by different professions, the approach for handing same course should be drastically different. Generally, same faculty teach in different courses. Non-existence of relevant expertise of the domain, may affect the learning of students. Although, faculties can put an extra effort to avoid such situations.

At times, lack of motivation in faculty or unavailability of time can take a toll on student's learning.

5.3. Class size

For effective teaching and one to one discussion with students, class size should not be very large. So many researchers have worked on effect and implementation of class-size reduction programme (CSRP). In general larger class sizes prevent faculties to inculcate a culture of student's participation in problem discussion, knowledge sharing and case analysis.

A smaller group of student's in the form of tutorials is an alternative option but in many institutions/course, tutorials are not scheduled, which makes it difficult to introduce peer tutoring, and peer assessment to significantly improve student's outcome.

5.4. Unavailability of labs

Unfortunately, many universities do not prefer investing for labs, soft-wares, and technical & support staffs for teaching decision sciences. Universities offer only theoretical course with little to no practical exposure on solving complex problems with the help of computing tools, whereas industries call for the practical problem solving skill with at least some hand-on experience.

5.5. lack of self-motivation in faculties

Lack of self-motivation in students as well as in faculties can be hazardous for learning community. There can be various factors, which leads to confiscating the enthusiasm and passion for educators for being in the profession for a noble cause (a detailed discussion of the same is out of scope of present article).

In today's corporate environment, faculties are loaded with lot of administrative work, documentation, handling co-curricular activities, organization of conferences/seminars, handling student's project, day to day meetings, report preparations, also playing a role of counsellor in the form of student's mentor, interaction with parents. Multitasking may affect their ability to deliver the best in terms of teaching.

6.0 A Way-Out For Effective Teaching

After knowing what are the issues and why, a focus should be made on how we can design work process and technologies to help dealing with the same. Let's discuss some foremost way-out to deal with the issues opened above.

6.1. Curriculum

Curriculum of decision science courses should supports the fundamental tactical and operational decision making complications of applicable industry. The learning objective and outcomes should be kept in mind while preparing course curricula. Learning objective of each course should cumulate to build the desired program objective.

Expert opinion from academia, industry, information technology personnel should be a part of course designs process. Institutes should periodically review the course content, teaching and evaluation methods and update these as and when required. The sought after expertise, we want to inculcate in the students after completing the course, should from a basis of course design phase. Unique research and teaching activities are required to prepare course curriculum for student's careers in management, consulting, quality engineering, pharmaceutical research and academic leadership roles.

6.2. Pedagogy

Interactive and innovative instructional tools should be developed and used to create two way learning atmosphere and foster student's interest and participation/engagement. Case discussions in groups and offering minor projects in particular applied topics can not only help them to explore real life applications of the course but also improve their report writing and presentation skills. Technology should be used to bring transformation from traditional teaching methods to new open learning class. Online resources, web applets, audio-visual aids, virtual labs, video case studies, simulation games can be used in class room teaching to accomplish the goals of visualising abstract concepts, and vivifying boring content to improve teaching efficacy. Also, students can be encouraged to download and use scholarly mobile apps like in their smart phones to have a readily available access of the topic. Faculties should make a serious effort to build competitive environment and develop habit of reading & sharing. Emphasis should be made on day to day reading of newspaper, articles, magazines, blogs etc. to bring industry examples to class room. Various Club activities like – mathematical games, puzzles, brainstorming exercises, technical quizzes, mathematical writing contest, mathematical modelling competition, etc. can help in cultivating mathematical thinking and creative rational in students. To unveil them the beauty of the course visualizations and motion charts like Gap-minder can be used.

Encouraged use of online study groups, relevant videos, MOOC courses, networking, participation in workshops, seminars, conferences on latest trends can help stimulating interest of target students. Faculties should share their knowledge and experience with the interested students about how to undertake a project, significance of literature review, available open sources, and access of journal papers, books, or dissertations in their area of interest in order to enrich research interest in student's right from the beginning of their course or degree.

6.3. Preparation of self-learning material by educators

Keeping in mind the needs of student's studying similar courses but at different levels, faculties should always make dedicated effort for preparing each lecture. While teaching and interacting with students, instructors have the opportunity to guide students' findings, and cultivate a habit of continual learning in the process. In the incessant process of learning, unlearning and relearning is more essential.

As another rewarding aspect of teaching, faculties should enjoy the development of a well–designed course and associated materials in the process of organizing it for presentation. Dedicated efforts are required for planning out lecture notes, practice sets, home-works, lab assignments, quizzes, and projects with care to eliminate errors and avoidable misinterpretation, which allow students to get right to the heart of the problems. Although it is a time–consuming procedure and may require additional resources, but vastly improves the student experience.

Universities should support infrastructural capabilities like development of labs, and recruitment

of technical staff particularly for decision science course. Hands-on sessions on commonly used soft-wares for the course, and inviting experts from industry to share their knowledge on recent advancement in the area and support for in-house faculty training for updated experience on advanced tools used or desirable expertise can help students to get associated with the latest industry culture.

6.4. Encouraging student's involvement

Faculties should promote and discover ways to improve the attentiveness, interest, awareness, quality, and motivation of students to learn and excel decision science, for example, peer tutoring, academic counselling, walk-in and individual tutoring and information on: note-taking, time-management, exam preparation, stress management. Faculties can also opt for non-conventional methods for continuous evaluation like peer assessment, presentations, minor projects, case study analysis, viva voice, group discussions, etc. As supported by a famous quote "Never do anything for a student that he is capable of doing himself. If you do, you'll make him an educational cripple…a pedagogical paraplegic" by Howard Hendricks, adequate efforts should be made to attain student's involvement and develop a habit of struggling for self-learning. Students should focus on learning how to learn and teachers should emphasize on learning how to teach.

6.5. Role of academic administration

Institutes should endorse a culture of freedom and flexibility, provide enough breathing space to educators to attempt non-conventional working methods, adaptability to accept open and integrated work culture, alternate assessment rubrics, out-of the box thinking, inculcate new ideas, encourage faculties to discover their own way to attempt for the transform. Also, institutes should appreciate even small attainment in student's learning, academic performance, increased interest about the course.

In order to nurture stimulus for faculty's professional development, research oriented faculties can be offered less teaching and administrative load, while those passionate more about teaching should be preferably engaged in development for study material, use of technological tools to improve teaching effectiveness. Institutes can provide resources like library resources, labs, soft-wares, teaching or technical assistants, etc. to create supporting environment for emphasizing teaching and research quality. Institutes should encourage faculties and researchers to participate in conferences, QIP's, trainings, MPD's, FDP's or workshops as per their individual interest.

Universities should set-up centre of excellence for teaching decision sciences, or innovation in teaching decision sciences, where faculties of decision sciences works in collaboration of other departments like information, economics, social sciences etc. to bridge the gap between education researchers and practitioners by integrating the learning process. The department should make efforts to bring together scholars from a range of fields with an interest in decision making applying quantitative/ optimization methods.

7.0 Final Thoughts

The present article argues adaptation of modification into the culture of teaching practices. Author has addressed various issues involved in teaching decision sciences, the need for instructor's participation and examined the roles of various stake holder in learning community. It also stresses the need for patience and persistence when attempting change.

An attempt has been made to throw a light on multidimensional concerns involved in teaching decision sciences and other hard core mathematical subjects. Author has also touched upon use of technology and other tools can help to deal with the issues to a certain extent. Nonetheless innovation, continuous learning and improvement and more importantly willingness to adapt the ever chaining needs is the key.

References

[1] Jackson, A. W., & Davis, G. A. (2000). Turning points 2000: Educating adolescents in the 21st century. Teachers College Press, PO Box 20, Williston, VT 05495-0020.

[2] Nooriafshar, M., & Romero, O. (2004, April). Technology and innovation in teaching and learning production and operations management. In Proceedings of the 2nd World Conference on POM and 15th Annual POM Conference. Florida International University, Production and Operations Management Society.

[3] Sadler, I. (2013). The role of self-confidence in learning to teach in higher education. Innovations in Education and Teaching International, 50(2), 157-166.

[4] Li, G. (2014). Teaching mode innovation for undergraduates in operations management. World Transactions on Engineering and Technology Education 12(2).

[5] Umbach, P. D., & Wawrzynski, M. R. (2005). Faculty do matter: The role of college faculty in student learning and engagement. Research in Higher Education, 46(2), 153-184.

[6] http://en.thinkexist.com/quotes/henry_brooks_adams/

[7] DuFour, R., & Eaker, R. (1998). Professional Learning Communities at Work: Best Practices for Enhancing Student Achievement.

[8] Christensen, C. M., & Carlile, P. R. (2009). Course research: Using the case method to build and teach management theory. Academy of Management Learning & Education, 8(2), 240-251.

[9] https://www.informs.org/About-INFORMS/What-is-Operations-Research (2012)

[10] Yang, Y., He, Y., Zheng, S., & Wang, L. (2014, January). Study on Teaching Methods of Operations Research. In Proceedings of the 2012 International Conference on Cybernetics and Informatics (pp. 1513-1517). Springer New York.