

Action Research on Nurturing Higher Order Thinking among the Students of Innovation and Entrepreneurship

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Abstract

This action research project followed a typical cycle of identifying problem through reflection on teaching-learning process, planning for improvement and executing the plan, evaluating the impact of actions taken and then reflecting on the whole process. The goal of the action research project is to nurture the higher order thinking among the students of specific class. The researcher has applied Gagne's instructional events with the aim of nurturing higher order thinking amongst the first-year students of MBA (Innovation & Entrepreneurship) batch. The course being taught was 'Introduction to operations management'. I really learnt a lot from the whole process and found Gagne's instructional events enable us to communicate with students very effectively and also supports in developing effective learning experiences with specific goals. As per goals of action research, the study not only helped to improve the practice but also apply innovative learning methodologies with structured approach.

Keywords: Action Research, Gagne's Learning Taxonomy, Higher Order Thinking, Instructional Theory, Learning Experience

1. Introduction

Action research is appropriate for any person who wishes to improve his performance and it's widely used in education by teachers to improve the teaching-learning processes, Hien (2009). Action research is a type of an inquiry that is practical as it intends to make change to way of practice, theoretical as it guided by theory and aims to generate new insights as it is concerned with change and improvement of individual's practice. Air Asian and Gay (2003) while describing benefits of actions research for teachers noted that teacher develops deeper understanding of student, teaching learning processes and action research helps them to investigate and innovate their practices. This action research was carried out at Symbiosis Institute of Business Management (SIBM), Pune; Symbiosis International University, Pune.

At SIBM Pune, MBA (Innovation & Entrepreneurship) Programme is aimed at preparing students to nurture

the innovative ideas and start their own start-ups. The program is designed to motivate, train the students for innovative thinking and also to build up entrepreneurial mind-set. It also includes different management subjects addressing different functional domains. But it's expected that teachers should teach these subjects in such a way that students will be apply and synthesize the concepts learnt in their own business-plans or start-ups. It's expected and required from teachers to design assignments which will access higher order thinking of the students (Application, creation and evaluation).

As this was only 6th year in teaching, I continue to reflect upon my experiments in the classrooms and their effectiveness in developing students as better professionals. My experiences and learning's helped me to identify the need for action research as a teacher teaching a course in MBA (I&E) programme. As noted above, the ultimate need there is to develop 'higher order thinking' in students so that the students will be able to

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work on their business ideas and plans successfully. This was identified as a core need and as a teacher my task was to develop interventions to address this need. As noted by Burns (2000), Action research in education aims at identifying innovative approaches to teaching, learning to initiate positive change in classroom interactions.

As such, this action research is 'teacher research' where focus is on the needs of the student of this batch and the major interventions in teaching-learning process were done on the basis on Robert Gagne's (1985) nine steps of instructions.

2. Plan of Action Research

This section explains the problem statement, research objectives and research questions and scope of the study.

2.1 Problem Statement

To nurture higher order thinking among the students of MBA (Innovation & Entrepreneurship) at SIBM Pune: A study of interventions in teaching-learning process using Gagne's theory of instruction.

2.2 Scope of the Study

This study was conducted at Symbiosis Institute of Business Management, Pune and it was limited to the MBA (Innovation & Entrepreneurship), first year i.e. batch of 2017-19 where the total number of students was 46.

The course being taught was 'Introduction to operations management'. This course is 2 credit course with total marks 100 where 60 marks are for internal assessment (formative) and 40 marks are for final summative assessment.

2.3 Research Questions

This endeavor seeks to modify teaching-learning process based on Gagne's theory of instructions (Gagne, 1965) so that learning experiences would enable students to develop higher order thinking. The terminology 'higher order thinking' is adopted from revised blooms taxonomy (1985) which includes majorly three levels of learning viz. analysis, evaluation and creation.

1. What kind of tools are required to create learning experiences which will address the higher order

learning needs of the students and they will be able to apply the learning's in start-up context?

2. What kind of assessment tools are required to access the higher order thinking skills of MBA (I&E) students?
3. Has the intervention based on Gagne's instruction theory brought the change in teaching- learning process so that higher order thinking skills developed in students?

2.4 Research Objectives

Based on above research questions, following research objectives were developed.

1. To design and develop learning experiences which will nurture higher order thinking ability among the students.
2. To design and develop assessment tools which will ensure the development and assessment of higher order thinking skills in students.
3. To measure the effectiveness of teaching learning process with interventions based on Gagne's instruction theory.

3. Literature Review

Along with learning taxonomies, it was required to refer to literature which will support for development of learning experiences. This section refers to the literature on instructional theories.

Reigeluth (1979) proposed an instructional-design theory offering explicit guidance on how to help people learn and develop. The kinds of learning would include cognitive, emotional, social, physical, and spiritual. Instruction should clearly provide authentic information, effective practice, positive feedback and motivation to the learner (Perkins, 1992).

Before Gagne's contribution to the instructional theory, major focus was on: 1. Curriculum theory, and 2. Applied learning theory. According to Smith & Ragan (1996), Bruner and Tyler (1960), were the two theorists who contributed to the field of instructional theory. Bruner (1968) has focused on adequacy of the instructions where he mentioned four important elements of instructions as: 1. experiences which will induce motivation to learn, 2. optimal structures of knowledge for learning, 3. optimal sequences of encounter, and 4. the nature of rewards and punishments. Instructional-design theories describe

methods of instruction and the situations in which those methods can be applied.

Gagne (1965) developed four major propositions that constituted his instructional theory. These four propositions are:

1. Learning goals can be classified as to learning outcome or knowledge category,
2. Different outcome requires different internal process,
3. Learning outcomes can be presented in the form of prerequisite relationship, and
4. Adoption of Different outcome categories requires different instructional processes.

Reigeluth (1983) argued that design begins with the identification of goals of learning. He further specified that to make instructional theory effective it should be aligned with learning theory. According to Gagne (1972), there are five major categories of learning outcomes as follows: 1. Verbal Information, 2. Intellectual Skills, 3. Cognitive Strategies, 4. Attitudes, and 5. Motor Skills.

4. Methods

This action research is a typical 'teacher research' aimed at improvements in teaching – learning process of the researcher. The educational action research has three broad categories teacher research, collaborative research and school-wide macro level action research on the basis of major goals, organisational settings, interested stakeholders and impact (Calhoun, 1993). The teacher research is focused to bring changes in a one classroom (one course) to improve teaching-learning process. Research process followed is based on definitions of action research by Lewin (1946). He defined action research as a comparative research on the conditions and effects on variety of social actions and research leading to social action. Such action research involves a circle of planning, execution and analysing the result of the action. Being a practitioner/teacher I understand that, I must develop qualities of the 'professional' with continuous reflection. The process of this action research project depicts self-reflective inquiry. Carr and Kemmis (1986) argue that an action research is the form of self-reflective inquiry initiated by practitioner in social situations in order to improve the practices and underlying conditions. They have also referred to self-reflective inquiry by teachers for action research in educational settings. It is suitable

classroom where teachers wish to bring about the change or improvement in their teaching and at the same time develop an understanding which informs the change. Kemmis (1991) proposed a model of the cyclic nature of the action research process where each cycle of an action research has four steps: plan, act, observe and reflect. Susman (1983) suggested five steps for conducting action research and the steps are shown in the (Figure 1).

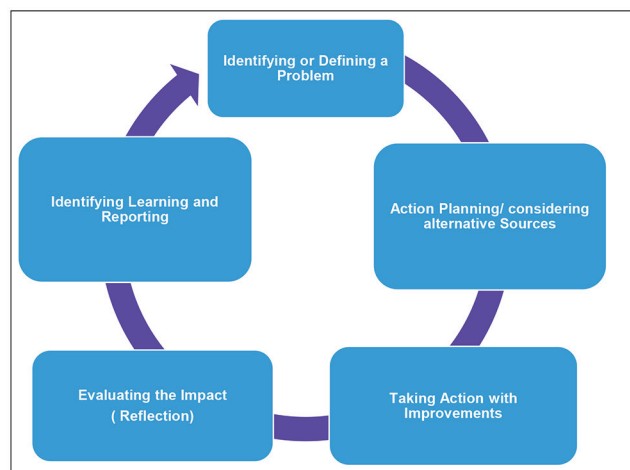


Figure 1. Five steps of action research (Susman, 1983).

4.1 Operational Definitions

Operational definitions of the terminologies used in this research report are explained here for reference.

Higher-Order Thinking (HOT): Higher order thinking is thinking on a level that is higher than memorizing facts. It takes thinking to higher levels than restating the facts and requires students to do understand them, infer from them, connect them to other facts analyse them, and apply them as we seek new solutions to new problems.

Entrepreneurial mind-set / thinking: Entrepreneurial mind-set refers to a unique state of mind which motivates an individual for entrepreneurial activities and outcomes. Individual with entrepreneurial mind-set pursue new opportunities, innovation and contributes in value creation.

Start-ups: start up is an enterprise that is in the initial stage of its operations. Start-up are mostly pioneering companies focusing on developing an innovative product or service offering solution to the problem.

Business idea: A business idea is a concept that is usually galloped on a product or service which can be exchanged for money. Promising business idea is always

innovative, unique, and clear focused, commercially viable/profitable in the long run.

Business plans: A written plan detailing about different functions of the business like finances, operations, marketing, etc.

Learning experiences: Learning experience refers to any interaction, course, program, or other experience which aims at learning, whether it occurs in traditional classroom settings or non-traditional settings like outdoor environments. Non-traditional settings may include student learning through games and activities.

Learning tools: A learning tool is something which student uses to work through various theoretical concepts and responding to teaching-learning process or concepts being taught in the class or outside classroom.

Assessment tools: The various tools/methods used for accessing student learning (may be formative or summative).

4.2 Data Collection and Analysis Methods

The principles of action research were followed during this project. Systematic gathering of information about a specific course, class and impact of interventions was done and it also includes ongoing self-reflection and improvement. From the literature it's observed that within education system, action researchers use qualitative methods to observe an educational intervention in their own teaching environments. The action research intends to describe what is happening in the classroom, what happened after particular intervention, practitioner's reflection and improvements observed or experienced.

The data collection methods used in this qualitative action research project includes participant (student) observation, interviews with student/ student groups, analysis of student assignments and presentations. Creswell (2002) defines participant observation as 'an observational role adopted by researcher when they take part in activities in the setting they observe'. The extent

of participant may vary depending on the situation and goals of action researchers. Mills & Treagust (2003) also noted that teachers by virtue of their teaching are actually active participant observers of teaching learning process. As a reflective practitioner, teachers observe outcome of their teaching and strive for continual improvement in teaching-learning process. I planned for observing impact of my interventions based on Gagne's instruction events. As a part of internal (formative) assessment, student groups were supposed to make presentations in front of the class and it was planned in such a way that students have complete freedom to present it any form as if they are teaching that particular topic to the class. So, student also served as 'instructor' to each other. I also learnt a lot from them as they do learn from me.

Analysis and observations are done on the basis of certain documents like assignments submitted by students in hard copy format (hand written), analysis of power point presentations submitted by students and subsequent interview with each student and student groups.

5. Interventions Based on Gagne's Instruction Theory

Learning experiences were planned in line with Gagne's nine instruction events and accordingly learning material and assessment/evaluation tools were planned. While planning for evaluation tools/assignments also, the 'learning experience' was the focus rather than only checking or accessing the learning's and level of learning.

During this course, I followed Gagne's nine instructional events in a structured approach for communicating with the class. 'gaining attention' 'informing learners of the objectives' and 'present the stimulus' was my primary focus in first lecture which was for 3 hours. The interventions used in 8 lectures and their reference to Gagne's instructional events are elaborated in the (Table 1).

Table 1. Details of interventions based on Gagne's instructional events

| Session & Topic/s | Interventions/Learning tools used | Reference to Gagne's Instructional event |
|--|---|--|
| Session 1: Introduction to operations management (value chain analysis, news analysis and basics of operations management) | a. Introduction and mapping expectations -1 hr. b. Socrates method of questioning c. Newspaper analysis: How to conduct analysis of business news with respect to operations perspective. | Gaining attention (reception) Informing learners of the goals(expectancy) Retrieval of prior knowledge |

| | | |
|---|---|---|
| Session 2: Location of facilities | <p><i>Open air class (at amphitheatre)</i> – All students were grouped according to the region they come from and asked to identify what is the most popular product/ s industry in that region since years.</p> <p>At the time of final discussion, each group was asked reason why the particular industries are located in that region. Then debriefing was done on all the reasons of industry and their locations.</p> | <p>Stimulating recall of prior learning (retrieval)</p> <p>Presenting the stimulus (selective perception)</p> <p>Providing learning guidance (semantic encoding)</p> |
| Session 3: Facility Layouts | <p>Ball Game describing concepts on cycle time and layout was played. Further, student groups (Randomly made) were asked to select any industry type and plan the layout for that industry and present the same in class after 30 minutes. Everybody was equally involved in this discussion and presentation.</p> | <p>Gaining attention (reception). Informing learners of the objective (expectancy)</p> <p>Presenting the stimulus (selective perception)</p> <p>Providing learning guidance (semantic encoding)</p> <p>Providing feedback (reinforcement)</p> |
| Session 4: Process Analysis | <p>Bottlenecks Game through parchment paper. Process analysis was taught using game played with the use of templates and trace papers. Students were asked their experience and critical issues they faced while playing. This was followed by teaching concepts of bottlenecks, little’s law and capacity.</p> | <p>Gaining attention (reception)</p> <p>Informing learners of the objective (expectancy)</p> <p>Presenting the stimulus (selective perception)</p> <p>Providing learning guidance (semantic encoding)</p> <p>Providing feedback (reinforcement)</p> |
| Session 5: Materials Management and Purchasing | <p>Principle of Cooperative learning was used here. Students were divided in groups and were asked to work on different products for material planning, Purchasing, Quality Control, Vendors, etc. Everybody in the class was deeply involved.</p> | <p>Informing learners of the objective (expectancy)</p> <p>Presenting the stimulus (selective perception)</p> <p>Providing learning guidance (semantic encoding)</p> <p>Eliciting performance (responding)</p> <p>Providing feedback (reinforcement)</p> <p>Enhancing retention and transfer (generalization)</p> |
| Session 6: Introduction to Quality control/ assurance | <p>Socrates method of questioning was followed, and discussion continued with examples to explain history & basics of quality control.</p> | <p>Stimulating recall of prior learning (retrieval)</p> <p>Presenting the stimulus (selective perception)</p> <p>Providing learning guidance (semantic encoding)</p> <p>Providing feedback (reinforcement)</p> |
| Session 7: Cost of Quality (planned topic) | <p>Concept of ‘Cost of Quality’ was also taught in short with the use of questioning technique and power point presentation</p> | <p>Stimulating recall of prior learning (retrieval)</p> <p>Presenting the stimulus (selective perception)</p> <p>Providing learning guidance (semantic encoding)</p> |
| Session 8: Value engineering (student group presentation) + quality control tools – pareto chart and ishikawa diagram | <p>Presentation of value engineering by student group which included oral presentation +class activity conducted by the presenting group itself.</p> <p>Quality control tools- taught through discussion and examples practice on worksheet.</p> | <p>Stimulating recall of prior learning (retrieval)</p> <p>Providing learning guidance (semantic encoding)</p> <p>Eliciting performance (responding)</p> <p>Providing feedback (reinforcement)</p> <p>Enhancing retention and transfer (generalization)</p> |

| Assessment plan and details: For a 2 credit course, 3 formative evaluations were conducted | |
|---|---|
| Internal assessment | Details |
| Component 1: News analysis from newspaper news or any business magazines | Individual assignment (hand written only) <i>Levels targeted: apply, analyse and evaluate</i> |
| Component 2: Value chain analysis of any selected business/firm/organisation | Individual assignment (presentations with 6 slides only). Levels targeted: apply and analyse. |
| Component 3: Group presentation on a selected topic in operations management stream which is allotted after discussion with students. | Group assignment. Levels Targeted: All Levels take care here. Remember, understand, apply, analyse, evaluate and create. |

6. Findings and Analysis

As mentioned (Table 1) in data collection, multiple

modes were used and I am presenting my experience here in the format referring to Gagne's taxonomy of learning outcomes (Table 2).

Table 2. Analysis pertaining to higher order thinking skills on the basis of learning outcomes

| Summary of sessions | My experience, observation and analysis after student interviews |
|---|---|
| Session 1: Introduction to operations management- As it was first class, focus was on building relationship and understanding significance of this course. | Students were very positive and I observed the enthusiasm to learn when I taught them analysis of the news from economic times. In the assignment of 'News analysis' I observed that students were actually able to find out relevant news and analyse them from different operations perspective. The most important thing is that it created interest in them towards this course. Targeted Learning outcome was ' <i>analyse and evaluate</i> ' could be observed through assignments. |
| Session 2: Facility location- Students were grouped according to the region they come from and they were asked to identify what is the most popular product/ s industry in that region since years. At the time of final discussion, each group was asked reason why the particular industries are located in that region. Then debriefing was done on all the reasons of industry and their locations. | Students were happy because discussion was planned outside the classroom. All groups got so engaged in discussion about their own regions and industry in that region, they presented well and felt proud about the region too. Targeted learning outcome ' <i>analyse and evaluate</i> ' was visible easily <i>as students were presenting on why these industries are there in the particular region since years.</i> |
| Session 3: Facility layouts: Student groups (randomly made) were asked to select any industry type and plan the layout for that industry and present the same in class after 30 minutes. | Students understood the concept. Targeted levels of learning outcome were analyse, create as they were supposed to present layout of selected business/firm. Not all the groups were able to present successfully and detail de-briefing was required for more clarity. |
| Session 4: Process analysis was taught using game played with the use of templates and trace papers. Students were asked their experience and critical issues they faced while playing. | The targeted learning outcome level was ' <i>apply, analyse and evaluate</i> (evaluation after playing game). The class activity was successful and I observed that students were able to <i>analyse</i> the different perspectives in process after playing the game. |

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|---|---|
| Session 5: Materials management and purchasing: principles of cooperative learning were used for group activity. | Targeted learning outcome levels were: 'apply, analyse, and create. I could easily observe that students were quiet involved in the assignment as a challenge and they were able to attend' creation' level successfully. |
| Session 6: Quality control/assurance | More focus on comprehend and understand in this lecture. But through discussion and questioning technique; I could see that 'Student were able to analyse the examples & situations I was throwing openly for discussion. |
| Session 7: Discussion on 'live project' | As live project itself aimed at taking students to 'apply, Create and Evaluate level; during this class. I observed that students were good in new ideas and applying them to perform some business but many of them (at that stage- on a day of this session) were not in a position to evaluate the situations where they will face challenges for performing and operating their business. |
| Session 8: Student group presentation on value engineering and lecture on – quality control tools. | The presentation was excellent and tshe whole class witnessed the creativity and intelligence of the presenting group members. All levels from comprehend to create were quiet visible in presentation. |
| My observation and assessment on assignments submitted/presented by students | |
| Component 1: News analysis (from newspapers or business magazines) | Almost half the students in class discussed their selected News, drafts written by them with me. When announced in class they liked it and when they started work they found lit little challenging however the submissions were quiet good. Also I personally interacted with students to gather their personal opinion about such different assignment and many of them shared that it was new but great learning experience for them. The H.O.T. levels aimed were analyse, evaluate and I found that this assignment enabled them to reach to develop analysis and evaluation capability. |
| Component 2: Value chain analysis with respect to selected industry/firm by each student. (separate industry/firm to be selected by each student) | What I observed here is students did struggle little bit to complete this assignment. Their submissions were not so effective w.r.to expectations. The H.O.T. levels aimed were apply, analyse and my observation was that students found it little difficult to present it in the form of power point presentation. I realised that to develop such ability through this assignment would require additional efforts like from my side. |

7. Limitations of the Study

For the group assignments, I did not make the groups. So, the groups were totally dynamic as they are made by students and also there no fixed size of group mentioned in guidelines for these assignments. One of the limitations is that I did not introduce any intervention or tool to check group dynamics but I had observed that there were no free riders in any group. Business schools mainly use case study based teaching approach however, I had not used case studies in the sessions conducted and monitored under this study.

8. Conclusion

I found that Gagne's instructional events and focus on Gagne's learning taxonomy helps a lot to

improve teaching- learning process. It enables us to communicate effectively with students and set the right learning goals for all the processes whether it be teaching or assessment. From the limitations faced, I learnt a lot and I see a future area for action research (in my course and classes) as accessing the group dynamics and checking individual effort and group effort with a properly designed tool/rubric. I learnt here that work itself is not only the motivation for the students in today's business schools; the content of work is vital element of learning. Another important learning is that teachers must have structured follow up procedure and program to access the progress. Further, there is future scope for deeper action research using other ways of teaching like case based method of teaching.

9. References

1. Bruner, L. J. (1960). Low-Temperature Internal Friction in Face-Centered Cubic and Body-Centered Cubic Metals. *Physical Review*, 118(2), 399.
2. Bruner, J. S. (1968). Processes of cognitive growth: Infancy.
3. Burns, A. (2000). Facilitating collaborative action research: Some insights from the AMEP.
4. Calhoun, E.F. (1993). Action Research: Three Approaches. *Educational leadership*, 51(2), 62–65.
5. Carr, W. & Kemmis, S. (1986). *Becoming Critical: Education, Knowledge and Action Research*. London: Falmer.
6. Creswell, J.W. (2002). *Educational research: Planning, conducting, and evaluating quantitative*. Upper Saddle River, NJ: Prentice Hall. p. 146–166
7. Dick, B. (2002). Action research: action and research. Accessed on Feb, 3, 2007.
8. Gagné, R. M. (1965). *Conditions of learning*.
9. Gagné, R. M. (1972). Domains of learning. *Interchange*, 3(1), 1-8.
10. Gagne, R. M.(1985). *The conditions of learning*.
11. Hien, T.T.T. (2009). Why is action research suitable for education? *VNU Journal of Foreign Studies*, 25(2).
12. Kemmis, S. (1991). Improving education through action research in Zuber-SkerritOrtrun. Action research in *Higher Education, Griffith University, Brisbane*.
13. Lewin, K. (1946). Action research and minority problems. *Journal of Social Issues*, 2(4), 34–46. <https://doi.org/10.1111/j.1540-4560.1946.tb02295.x>.
14. Mills, J. E., & Treagust, D. F. (2003). Engineering education—Is problem-based or project-based learning the answer. *Australasian journal of engineering education*, 3(2), 2-16.
15. Perkins, D. N., & Salomon, G. (1992). Transfer of learning. *International encyclopedia of education*, 2, 6452-6457.
16. Reigeluth, C. M. (1979). In search of a better way to organize instruction: The elaboration theory. *Journal of Instructional Development*, 2(3), 8-15.
17. Reigeluth, C. M. (1983). *Instructional design theories and models: An overview of their current status*. Routledge.
18. Smith, P. L., & Ragan, T. J. (1996). Impact of RM Gagne's Work on Instructional Theory.
19. Susman, G.I. (1983). Action research: A socio-technical systems perspective. *Beyond Method: Strategies for Social Research*, 95, 113.