IOSR Journal of Research & Method in Education (IOSR-JRME)
e-ISSN: 2320–7388,p-ISSN: 2320–737X Volume 5, Issue 1 Ver. I (Jan - Feb. 2015), PP 24-28
www.iosrjournals.org

Chalk and Talk Versus Classroom Flipping: Results of a Case Study

Sudhanva V. Char, Ph.D., Cherry A. Collier, Ph.D.,
Adjunct Professor, Dept. of Nutrition and Dietetics
Associate *Professor, Dept. of Psychology*
Life University, Marietta, GA 30060

Abstract: *Economics instructors making use of 'chalk and talk' traditional method are experimenting with intellectually stimulating teaching techniques in sync with visual, auditory and kinesthetic (VAK) and other student learning styles thereby reorienting instruction to individual cognitive processes. It is hoped that there would be more student engagement, interaction and success. Recent text books in economics provide scope for trying out cutting edge techniques such as embedding more VAK components in instruction enabling 'classroom flipping' instruction such that there is more critical thinking and hands-on 'home-work' done in class time, more discussion and more independent learning, increasing the role of multimedia, case studies, and a preoccupation with learning. The instructor is able to ascertain candidly and in real time what learning style is securing desired learning outcomes with the student or what is not. A study of post-hoc data of student outcomes of microeconomics courses that used classroom flipping showed student appreciation of teacher efforts, but no significant improvement in results. There was not enough evidence to reject the hypothesis of identical scores (P-value = 0.294493) for all four microeconomics classes, two of which had only 'talk and chalk' and two others were fitted with computer assisted instruction to allow 'classroom flipping.' Overall, larger sample sizes and more clinical precision in isolating the students' course results could bring out definitive if not different results, and perhaps better academic outcomes too, decreasing the gap between what is taught and what is learnt.*

I. Introduction

Literature Review

As always, there is a real need to get the best outcomes in terms of student accomplishments in college economics and business courses. This paper looks at not the supply side of economics instruction as is typically done, but the demand side of students wanting to acquire skills in the subject using more of their own learning styles. There is a surfeit of theoretical and well-documented empirical literature on creating teaching materials for economics instruction, but not as much for the demand side of how students learn. The human mind processes information according to the preferred sensory modalities of the individual student. There is no uniformity in learning modalities, but students possess in varying degrees all five key sensory modalities of visual, auditory, kinesthetic, olfactory and gustatory (VAKOG) learning abilities. The focus in studies of this nature, for pragmatic purposes is however on the first three VAK modalities rather than on all five.

To the critical dialogues in economics pedagogy, the change in perspective to the demand side adds a new dimension to economics instruction. There is a case for experimenting with differentiated instruction to complement varied learning styles. Teachers can be smug about their formal instruction method, and not feel accountable to students for their individual learning styles. There is academic virtue trying out new teaching methods (as listed by Buckles and Hoyt 2006) designed to match the VAKOG needs of students so that there is more student engagement and more independent learning.

Depending upon the instructor's and the institution's stage of teaching technology, this trend towards reorientation of instruction is indeed a big deal. The response of the instructor is likely to be swayed by how long the person has been teaching and how well-versed a person is in techniques such as economics labs and computer games, computer aided instruction including on-line work-out, test-taking, seminars, economic story-telling, digital learning, classroom flipping and so forth that contribute to active student attendance and participation. 'Student-centeredness' is also an important contributor to adapting instruction to student learning styles. In such a milieu it is hard for the system to 'leave students behind.' There is likely to be a better appreciation of the different sensory and cognitive filters to process and understand new information and shape one's perception, both in the classroom and outside in everyday life. The filters help make sense of our learning experiences and affect the ability to learn. They are long-lasting and may change just marginally over time. (Bijayanand Naik 2003) They are labeled preferred representational systems (PRS) in neuro-linguistic programming (Bandler and Grinder 1979, O'Connor and Seymour 1990, Bandler 1996). PRS is classified, as noted earlier, into five main types – VAKOG and combinations thereof. It may be rewarding to check student

preferences (Barbe and Swassing 1979). Good visual designs promote comprehension and student engagement (Bartoletti 2008). Skeptical counter arguments against 'learning styles' come from Reiner and Willingham: "There is no credible evidence that learning styles exist" and "A belief in learning styles is not necessary to incorporating useful knowledge about learning into one's teaching."

Learning Styles Awareness

Achieving desirable outcomes in economics education requires meticulous pedagogical planning for teaching the "dismal" science which George Stigler (1970) himself believed is a difficult subject to teach. There cannot be a one-cap-fits-all single plan for all kinds of classroom settings ignoring vast diversity. It is preferable to invest in several plans with innovative teaching methods and techniques to suit distinct sets of students with diverse learning skills and backgrounds. Yet, where classes are large, usually the 'chalk and talk' lecture method prevails and there is diminished scope for innovative instruction. Where classes are relatively smaller, there is more scope for more effective teaching techniques keeping in mind students' learning modalities and individualizing instruction. Mark Edmundson (2013) states "A good teacher is often a Groucho Marxist because the job is to provide alternatives to whatever is out there. It is to provide an alternative to convention and conformity. Convention fits some people, but not all." Zapalska and Dabb (2002) are convinced that the way students learn should affect teaching strategies.

Research in economics education has considerable vintage thanks to the work of National Council on Economic Education and the Advisory Committee on Economic Education, and The Journal of Economic Education (JEE). There is substantial literature about teaching techniques appropriate to small and large classes. JEE has published research papers entitled 'Learning Styles' even as early as 1970s (Fry 1978). Most of them argue for new learning styles and others comment negatively. Zapalska and Dabb (2002) came up with a research paper "to describe an assessment instrument that college professors can use to identify their own teaching strategies as well as to help their students become more aware of their own learning strategies and motivation for learning." The authors argued that instructional outcomes could improve by teaching in a manner that was "consistent with the student's learning style." In contrast, there are other studies (Reiner and Willingham 2010) warning against putting too much faith in learning styles and their value is limited. The real need to pay attention to information processing strategies is underscored by Anita Woolfolk (2007) who asks instructors to offer knowledge in easy to manage 'chunks,' by repetition and straightforward communication.

The thinking on pedagogical plans for economics teaching crystallizes in Teaching Economics: More Alternatives to Chalk and Talk (Becker, Watts and Becker 2006.) The tome's chapter on 'Restoring Fun to Game Theory' (Dixit 2006) on the use of well-designed games in classes to explain the concepts of strategy, backward induction and Nash equilibrium is a well-thought out piece of this kind. The Dixit paper intuitively relies on kinesthetic experiencing of the transactions in digital games and the recent 'classroom flipping' technique resembles it. (Knewton 2011) The chapter on double auction market experiments to drive home the lesson of price determination by the market forces of demand and supply (Hazlett 2006) as well as the chapter on 'Active Learning Techniques in Large Lecture Classes' (Buckles and Hoyt 2006) commend themselves to economics and business teachers.

The Bell Shaped Curve and Student Centeredness

Most instructors believe in the adage: He knows best who knows how to learn. However, discussions of this type invariably bring up complex questions of the philosophy of teaching. Some of them are: Are not students responsible for their learning? What can the teacher do if they are unenthusiastic apprentices, and what is equally discouraging, lack observational and intuitive skills? What happens if they lack the mental accoutrements to learn economics? Are not teachers merely facilitating learning by being diligent guides showing students how to learn? How can the educational outcomes have a pattern other than the predictable bell shaped curve? Who can help those outliers on the left of the bell curve? The finite answer to most of these questions is that in the ultimate analysis teachers are indeed accountable, more or less, for educational outcomes. Effective teaching cannot but be student-centered, helping them to realize learning goals despite limitations of one kind or the other. Economics teachers, like all else, need to resort to whatever method of teaching engages the students, enhances their learning and accomplishes stated goals including inculcating critical thinking skills.

A teacher's goal thus defined, the next question is how diverse learning abilities and styles may be factored into the curriculum. Economics looks back to the cognitive sciences and in particular, to the sensory and cognitive filters that students employ to understand economics or business or any structured body of knowledge. This new emphasis does not however call for a new order of instruction per se. It is both plausible and real that many diligent instructors instinctively already pay heed to student learning styles in designing curriculum. For instance, it was noted that in the Dixit game theoretic experiments that the kinesthetic learning style was spontaneously used. When instructors employ power point and video resources, they are putting faith in the visual and audio learning styles. When instructors ask students to research and build demand-supply

schedules for the I-phone or the Kindle, the focus is on the student's kinesthetic style. In "The Manga Guide to Calculus" Japanese-style animation provides instruction. The book's author, economics professor Hiroyuki Kojima uses comics to explore calculus, and a similar method is used for imparting instruction in physics, statistics and molecular biology (Chang 2010). Thanks to information technology, it is now possible for the teacher to put the economics world on the palm of the student to enable better grasp.

Post-hoc Data Analysis of Classroom Flipping

Between Fall 2011 and Spring 2012 over two introductory microeconomic courses each with 5 academic credits, an attempt was made by one of the authors to experiment with partial classroom flipping by means of posting most teaching materials including specimen tests on the Blackboard that students could access anytime before coming to class, followed up by 45 minutes of classroom based 'homework.' The postings included graphs and problems such as graphing slopes and measuring them (rise over run), the circular flow diagram of US economy, the production possibility frontier, simulation and construction of demand and supply curves and price determination, elasticity of market forces, market efficiency, the pros and cons of government intervention in the market such as fixing minimum wage, rent ceilings, and commodity floors, figuring negative and positive externalities, cost of production, market structures including oligopoly and game theory, the Lorenz curve, gains from international trade. It could be cognitively demanding to model any one of these systems just like engineering students are asked to describe an aircraft lift-off (Mautone and Mayer 2001).

Flipping Methods

Students could consult or discuss with classmates or the instructor in completing the homework assignments in the classroom. The author supervised the deliberations in the class hands-on (kinesthetic) period when students did the exercises to understand the concepts and algorithms. Students earned credits for completing assignments in the classroom. Because the classes were small such as below 16 students, the entire testing process was manageable. The outcomes of these two classes were compared with two previous classes between Fall 2010 and Spring 2011 when just 'chalk and talk' was the only means of instruction and there was no classroom flipping. But for these two significant differences, there were no other divergences. The instructor and the text were the same. The test/quiz materials for all classes were generated by TESTGEN software. PowerPoint resources were identical. Study guides passed on to students in 'chalk and talk' classes were the same as those posted on Blackboard for 'classroom flipping' courses. Practice exercises and problems were also the same. But students had more learning materials (hard copy plus elearning) for flipping classes than for lecture instruction thanks to the convenience in posting ematerials including data spreadsheets, hyperlinks, and 'economics in the news' materials.

II. Analysis of Outcomes Data

To test the assumption of normal distribution of student outcome data, histograms and normal quantile plots were sketched, Figure 1 for a chalk and talk class, and Fig.2 for the flipped classroom. They bear out that they are somewhat bell-shaped Gaussian for both traditional and experimental classes but not symmetrical. Normal parametric statistical analysis can be applied to the course outcomes data. It is just possible that homework credits under 'chalk and talk' and under 'flipped classroom' by themselves would have highlighted the change in the learning component most impacted by classroom flipping, conforming to Walstad's (2006) formative rather than summary assessment of student outcomes. On account of inconvenience in storing and retrieving data relating to homework after a lapse of couple of years this was not done.

Fig. 1: Histogram and Normal Quantile Plot for Traditional Class

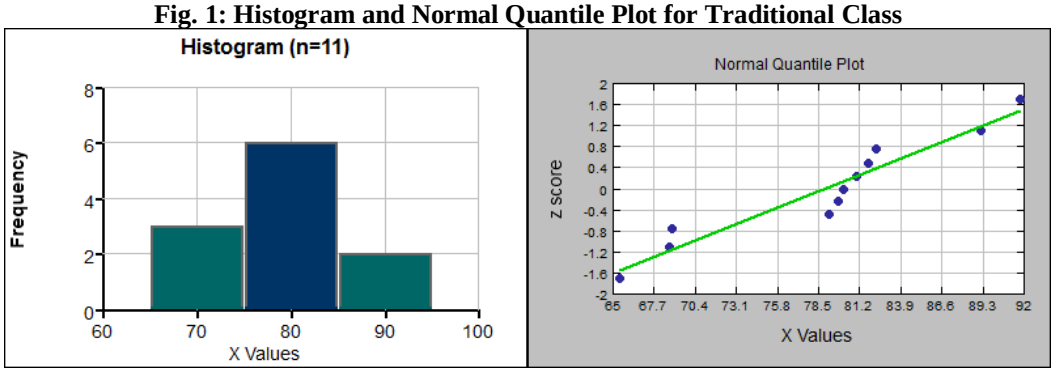
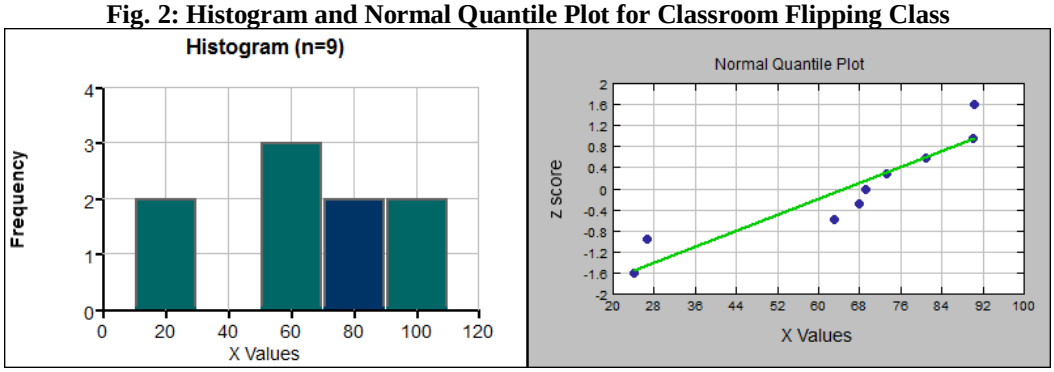


Fig. 2: Histogram and Normal Quantile Plot for Classroom Flipping Class



ANOVA

Analysis of variance data (ANOVA) of the results of two traditional 'chalk and talk' classes as compared to two 'classroom flipping' classes shows that there is no significant difference in the means of the four classes. In other words, the classroom flipping experiment did not improve the final student outcomes. If it did make a difference it would have showed up in the data and ANOVA would have captured such difference. The ANOVA results are presented in Table 1. For want of adequate evidence, the hypothesis of equal means for all classes cannot be rejected (See Table 1 below: Critical F = 2.87, Test Stat F = 1.14, P-Value = 0.345, Sig. level = 0.05).

Table 1: ANOVA of Outcomes of Two Traditional and Two Classroom Flipping

Source:	DF:	SS:	MS:	Test Stat, F:	Critical F:	P-Value:
Treatment:	3	1114.755468	371.585156	1.142272	2.874185	0.345553
Error:	35	11385.623506	325.303529			
Total:	38	12500.378974				

ANOVA of data of just one traditional class with two flipping classrooms leads to the same conclusions more or less as with two traditional and two flip classes. ANOVA data is given below in Table 2. It shows that the null hypothesis of equal means (or no difference in outcomes due to teaching techniques) cannot be rejected (P-Value = 0.294493) for want of sufficient evidence.

Table 2: Results of One Traditional Class and Two Classrooms Flipping

Source:	DF:	SS:	MS:	Test Stat, F:	Critical F:	P-Value:
Treatment:	2	961.548324	480.774162	1.275514	3.327651	0.294493
Error:	29	10930.846364	376.925737			
Total:	31	11892.394688				

III. Discussion

Post-hoc data analysis has several merits even if the outcomes may not be categorical or evident as in a randomized controlled study. They do however share one commonality albeit opposition from advocates of controlled study: some post-hoc data studies occur by way of happenstance almost like an afterthought like in this case. Neither the instructor nor the students knew that a couple of years later the data could be subjected to statistical analysis. In this unplanned case study the results indicate that classroom flipping did not make a difference as compared to 'chalk and talk' traditional teaching style. Even the percentage of students making 'C' or higher grades remained the same. The Reiner & Willingham skepticism referred to earlier about learning styles appears justified. All the same, in confidential course evaluation students appreciated the flipped classroom facility enabling learning online whenever the student desired and doing the graphs or problems in class by way of 'homework' under instructor supervision. Learning they felt, was easier this way.

IV. Limitations

Post-hoc investigation was confined to small classes, the sample sizes were small, and the studies themselves were an afterthought as is in fact the case in most post-hoc studies. Yet another shortcoming was the use of post-hoc 'summative assessment' data for analysis rather than continuous 'formative assessment' data as Walstad (2006) recommends. Comparable data relating to scores on 'homework' under traditional and flipped classroom settings perhaps would have pinpointed improvements if any.

V. Conclusion

There is growing interest in the effectiveness of multi-sensory instruction to students and so does their influence on academic and pedagogic planning (Rosenberg, 2010). Some studies have reported positive outcomes in regard to student achievements. When educators gradually incorporate a profusion of teaching methods needed to keep visual, auditory, kinesthetic, and auditory-digital learners engaged, hopefully the results are a) better understanding of the lecture material, b) more satisfying teaching/learning experience for both instructors and students and c) a narrowing of the gap between what was taught and what was learned. A failure to understand students' innate learning style needs may reduce attendance and compromise their academic achievements. In our case study however, there was not enough evidence that one such new (kinesthetic) learning method made a difference.

References

[1]. Bandler,R.,& Grinder, J. (1979). Frogs into princes': Neuro- linguistic programming. Boulder, CO: Real People Press.

[2]. Bandler, R. (1996). What is neuro-linguistic programming TM. Retrieved May 10, 2009, retrieved from: http://www.neurolinguisticprogramming.com/

[3]. Barbe W., & Swassing R.H. (1979). Teaching through modality strengths: concepts and practices, Columbus, OH: Zaner-Bloser.

[4]. Bartoletti, R. (2008). American Psychological Association (APA) Publication Manual: How Good Visual Design Helps Learning. DC: American Psychological Association.

[5]. Becker, W.E., Watts, M and Becker, S.R. Editors (2006) Teaching Economics, More Alternatives to Chalk and Talk, Edgar Elgar

[6]. Bijayananda Naik, (2003). "Learning Styles of Business Students." Bijayananda Naik, Proceedings of the 2003 Annual Conference of the Decision Sciences Institute, Washington, D. C., November 22-26, 2003 Retrieved from: http://people.usd.edu/~bnaik/research/LEARN.pdf

[7]. Buckles, S. and Hoyt, G.M. (2006) Using Active Learning Techniques in Large Classes, Chapter in Becker, Watts and Becker (2006), pp. 75-88

[8]. Chang, K (2010) "Algebra Refigured, Totally" Book Review, The New York Times Education Life, November 7, 2010, p.33

[9]. Dixit, A. (2006) Restoring Fun to Game Theory, Chapter in Becker, Watts and Becker (2006), pp.1-20

[10]. Edmundson, Mark (2013) Why Teach? In Defense of Real Education, Bloomsbury, p.184

[11]. Hazlett, D. (2006) Using Classroom Experiments to Teach Economics, Chapter in Becker, Watts and Becker (2006), pp. 21-38

[12]. Mautone, P. D., & Mayer, R. E. (2001). Signaling as a cognitive guide in multimedia learning. Journal of Educational Psychology, 93, 377-389.

[13]. Knewton (2011) The Flipped Classroom Infographics at http://www.knewton.com/flipped-classroom/ Retrieved August 10, 2011

[14]. O'Connor, J. & Seymour, J. (1990). Introducing neuro-linguistic programming: psychological skills for understanding and influencing people. London: Thorsons.

[15]. Reiner C. and Willingham D. (2010) The Myth of Learning Styles, Change: The Magazine of Higher Learning, September-October 2010, retrieved on 11/07/2010 from http://www.changemag.org/Archives/Back%20Issues/September-October%202010/the-myth-of-learning-full.html

[16]. Stigler, George (1970) "The Case, if Any, for Economic Education" Journal of Economic Education, Spring 1970, p.78

[17]. Walstad, William B. (2006) Assessment of Student Learning in Economics, Chapter 11 in Teaching Economics, More Alternatives to Chalk and Talk, Edited by William Becker et al, Edward Elgar, pp.193-212

[18]. Woolfolk, A. (2007). Educational psychology, 10th Ed. Boston, MA: Pearson Education, Inc.

[19]. Zapalska A.N., and Dabb H, (2002) Learning Styles, Journal of Teaching in International Business, 1528-6991, Volume 13, Issue 3, 2002, Pages 77 – 97