Flipped Instructional Technology: Developing MIS Competencies Applying Enterprise Resource Planning Software

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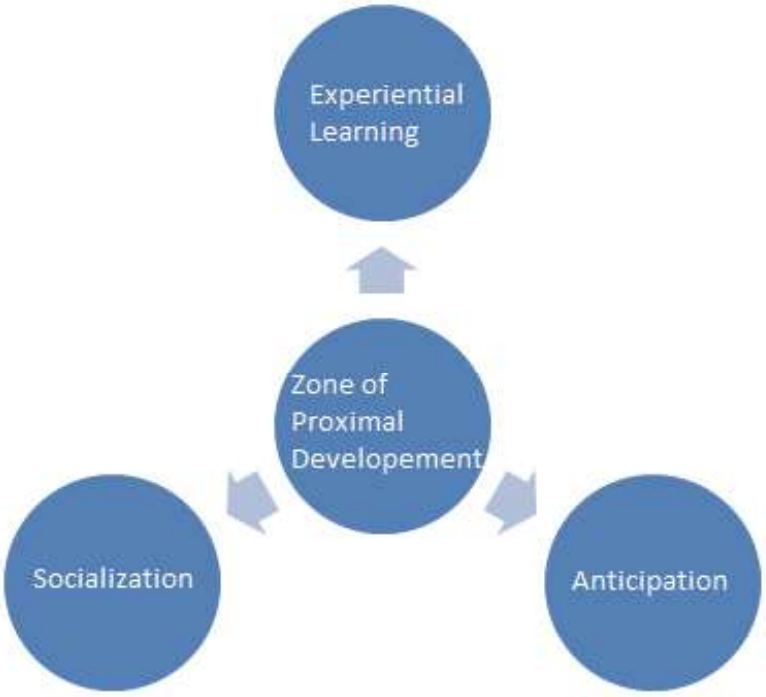
Most recently, the Flipped Classroom model has drawn the attention of many educators as an effective means of organizing and developing individual competencies. The goal in the university setting at Grand Valley State University, College of Business (GVSU) is to improve cognitive practice and increase learning in the value creation process and the zone of proximal development (ZPD) environment. Seeing one experiences this newest pedagogy in "flipped classroom" design, it has changed various educational disciplines in business education due to increased success that this model helps to create in the areas of learner motivation and comprehension - based on the objectives required for course work. Educational technology has played a key role providing a catalyst in this achievement.

INTRODUCTION

This paper is organized in four parts to thoroughly address the complexity of the ZPD and experiential learning theory, (Vygotsky 1978). The first part introduces the topic, and selected definitions of the terms used in the discourse. In order to guide the discourse, two questions will be proposed in the second part. 1) How does the ZPD create value to the learner and the organization? 2) How does the shared experience enable learning? In the last part, a conclusion is drawn, mentioning the limitations of the arguments provided in the debate and a suggestion is also made for future research in "flipped" instructional pedagogy.

An Overview of Selected Learning in the Flipped Classroom

FIGURE 1
ZONE OF PROXIMAL DEVELOPMENT (VYGOTSKY, 1978)



The "Flipped Classroom" approach is applied during the instructional delivery of the BUS 351 Management Information Systems at GVSU located Pew Campus in Grand Rapids, Michigan. Much success with the course in the past has applied a traditional instructional method of class lecture and computer lab time. Presently, the "flipped classroom" model allows more time for students to problem solve in teams, review class lectures outside of class with pre-recorded slides, sound and videos, and use valuable class-time completing class exercises. Seeing more than 50% of the focus of the class requires weekly hands-on exercises applying the integrated business processes with enterprise resource planning (ERP/SAP) software, students are allowed more in-class time for problem based learning (PBL) activities related to each weekly activity. Students have required reading assignments, quizzes, and instructor prepared recordings that are reviewed prior to class and applied to each weekly exercise. This "flipped classroom" model allows students to work both independently to complete outside class assignments to allow the students to achieve mastery at their learning pace. Further, when students come to class, they spend more time working with the instructor (subject matter expert) applying their outside class activities with higher level learning activities. Therefore, the "flipped classroom" model can be effectively applied to the theoretical approach to "The Zone of Proximal Development".

*The Z*one of Proximal Development (ZPD) inside the classroom setting or cyberspace continuous learning environments has borrowed practices and techniques from (Vygotsky 1978), (Bandura 1977), (Senge 1990), (Lave & Wenger 1991), (Brown & Duguid 1991), (Jenkins 2009), (Mupepi 2014) & (SAP.Com 2015), among many others.

(Vygotsky 1978) suggests that the Zone of Proximal Development (ZPD) can be adopted to develop the skillfulness of learners in different learning environments such as MIS. In the ZPD, Vygotsky propounds that competencies can be enhanced by the expert(s) demonstrating the "how to" in developing competencies. In the ZPD, Vygotsky demonstrates three stages of skills development by the novice. The

lower limit of ZPD is the level of skill reached by the learner working independently. The upper limit is the level of potential skill that the learner is able to reach with the assistance of a subject matter expert.
In Figure 1, the centricity of the ZPD is illustrated to be surrounded by three equal circles. If the circles are misaligned, the ZPD will not be real and the potential will learning not be achieved. Vygotsky also makes reference to a community of practice. The ZPD develops concepts that can be applied to understand job specifications and the competencies required to do certain jobs. (Mupepi 2014) suggests that the division of labor enables the managers to understand the skills dexterity in the job and the explicit knowledge to be successful. The division of labor is expanded and analyzed to understand the knowledge, skills, technology and disposition required by a worker to be become proficient.

(Bandura 1977) posits that the socialization process must be understood for learning to take place. The socialization process constitutes the environment of the learner at work, at home and in social contexts. This environment is agued by Bandura to be critical for successful skills and language acquisition. According to Bandura, he discusses the importance social learning theory in skills acquisition where people learn through observing others. As MIS students imitate the teacher this can be applied to the concept of socialization and learning. In the MIS area of study the students develops the MIS confidence and increase self-efficacy in their ability to apply their skills to execute a set of courses of action.

(Roehl, A., Reddy, S.L. & Shannon, G.J. 2013) suggest various ways in which we can use technology to free class time from lecture. Certainly increasing learning activities during class time provides improved teacher-to-student mentoring, peer-to-peer collaboration and cross disciplinary engagement. Most recently, the Flipped Classroom has been approached in various formats. This may include self-learning packages, problem based learning, project based learning, pre-recorded video lectures and or, demonstrations for personal review. It is important to focus on the level of knowledge transfer when one identifies the ZPD in this discourse. The Flipped Classroom is a step ahead of the ZPD model because of the emphasis on experiential learning, problem based learning and the relationship to solving problems in social contexts.

An Overview of Pedagogical Perspectives

An overview of current pedagogical perspectives has been drawn from a careful selection of literature to answer the questions: 1) How did the SAP software development really start? And, 2) How does the shared experience enable learning?

In 1972, the idea of creating a corporate software company was unheard of. SAP's five founders refused to let that stop them. They set out on a path that would transform the world of information technology and forever alter the way companies do business. Since then, SAP has moved on to what it is today to deliver, cloud solutions, enterprise resource planning, banking, customer relationship management, human resources, retail and mobile solutions. According to SAP (2015 a), the company is the world leader in enterprise applications in terms of software and software-related service revenue. Based on market capitalization, the company asserts that it is the world's third largest independent software manufacturer proceeded by Oracle and Microsoft at the helm. SAP has more than 291,000 customers in 190 countries, greater than 74,500 employees located globally, a 43-year history of improvement and evolution as a true industry leader and yearly income exceeding 18 billion euro dollars (SAP 2015 b).

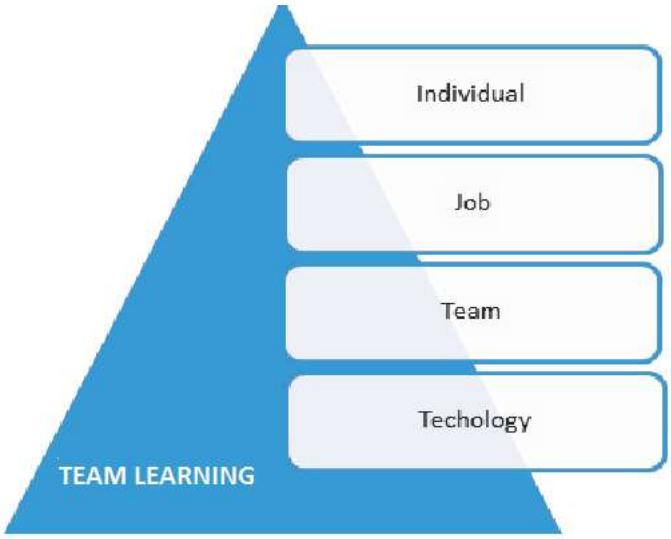
The concern of researchers, (Bandura 1977) (Vygotsky 1978) & (Senge 1991) has been focused on organizational learning & competence development. The research on skills transfer and knowledge acquisition in socially constructed learning environments have been expanded very well in Bandura, Vygotsky & Senge. In the case of the MIS approach, the skills transfer occurs in defined places such as; the workstation, the software, application usage, computer labs and real business problems. (Vygotsky 1978) argues that the ZPD is the space where the learner acquires desirable skills after consultation with the subject matter experts. Long after the experts have left, the novice continues to practice to make perfect his/her skillfulness. (Bandura 1977) suggests that the learner is influenced by the environmental factors to acquire knowledge and skills necessary to function in the ways the community desires. Bandura

introduces a community of practice concepts positioned in the environment. This community can be the family, the school, and workplace. Thus the socialization of the learner is critical to the acquisition of explicit practices.

Both Bandura and Vygotsky used children in their research. We are now applying the business model approach as the focal point of an older age group. Bandura and Vygotsky used their research with children and did not have business organization in mind. The ZPD context can now be focused in the context of student's learning in a business simulation in a computer lab in this situation. It was Bandura who defined the socialization process as a continuum of learning from home to school, and work. Thus, a student appreciates skills, knowledge and attitudes from this experience. The same can be said where the child can develop attitudes at home which can be shared at school or many social context.

(Senge, Kleiner, Roberts, Ross & Smith. 1994) propound about learning techniques. They identify five learning modules that can be applied to progress organization. The first learning model is "personal mastery" which constitutes the skills sets an individual must possess in doing a given job. Personal mastery allows the learner to build the capacity to use his/her skills to produce the goods and services demanded by the customers. In the MIS area of study, students build their confidence to use software such as SAP by constantly conversing and consulting with experts and sharing knowledge with other students. The second is "the mental model". This model includes reflection, clarification, and the ability to improve a shared window of the world. This model allows a community of practice in which to create, diffuse and distribute co-constructed practice. Senge suggests that a "shared vision is co-constructed as well. A shared problem is a problem solved.

FIGURE 2
TEAM LEARNING (SENGE ET AL; 1994)



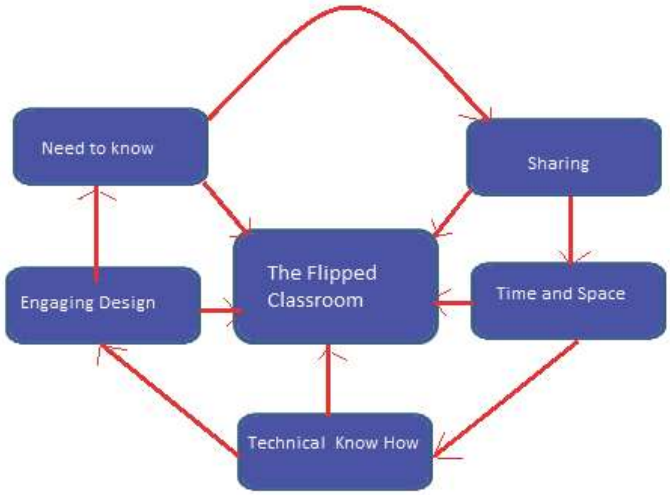
The forth model is about "team learning". The shared learning concept leads us to (Lave & Wenger 1991) about knowledge creation in distributed cognitive environments. They suggest that an organization can build community of practice based on the notion of highly cohesive teams. They propound that a community of practice can be composed of a group of people preferably from the same organization that meet in defined places at agreed times or in cyberspace at any time. A community of practice becomes a tool which can be deployed to enhance learning in the value creation process. The Flipped Classroom embraces the social interaction in the community of practice. In the MIS course, students learning the SAP software use the interaction of business problems to increase knowledge and skillfulness at solving problems. This process continues to build as the course progresses until the job is complete. In all, this problem solving experience amongst the team members builds confidence in the learning process.

(Senge, et al. 1994) alludes to the fact that the fifth learning discipline "systems thinking" which enables the entire organization to operate on the same page. Because a community of practice shares the same language, it implies they are aware of the organizational mission which each individual deduces his job description which resonates with the mission statement.

According to (Roehl, Reddy & Shannon 2013), it is suggested that the advantages of the Flipped Classroom are easy and use readily accessible technology. This allows for an expanded range of learning opportunities in a given time frame. The instructor gets to know each student "on a one-to-one bases" as they demonstrate how to use software or assists students as needed. These relationships continue by email, shared Google docs and with learning management systems online collaboration tools.

THE CENTRICITY OF THE FLIPPED CLASSROOM

FIGURE 3
THE FLIPPED CLASSROOM (MILLER 2012)



The Need to Know

(Miller 2012) suggests that there are 5 observations for the flipped classroom strategy. In the first part, emphasis is place on the "need to know" by the learner. The instructor will document this in the syllabus, which all those attending the class should have in hand. Prior knowledge is important for students. They need to understand the syllabus. For example, the University of Michigan was engaged in a law suit for cancelling classes because of snow and in the syllabus this was not pointed out. The plaintiffs argued that the grades they received in the end could have been better if the class was not cancelled. If they had prior knowledge of the cancelled class, they could have received a higher grade. The court awarded damages to the plaintiffs leading to refund of the tuition (Fraser, 2006). To continue the debate on need to know, prior knowledge is an essential skill.

Appreciating Models

The classroom instructor must identify a pedagogical model that stresses the learning. This may include concept such as, project based learning (PBL), problem based learning (PBL), game based learning (GML), understanding by design (UbD), and genuine literacy. Then the Flipped Classroom model can be assimilated to any of these concepts. (Lave and Wenger 1991), allude to the fact that the above models could be implemented in the Flipped Classroom effectively by a community of practice. The ZPD on the other hand, has been described distinctly by (Vygotsky 1978) to be the area where the novice acquires competence.

Simple Tools

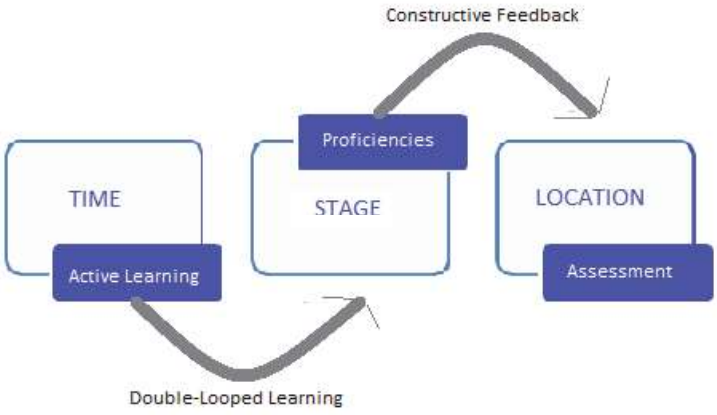
The community of practice need to know how to use the simple tools available in the classrooms, or within the learning community. Twenty-first century students are highly engaged with the educational technology tools in the ZPD. The tools allow for higher motivation, stimulation and comprehension. The technology enables students to interact among themselves, the virtual libraries, software, and instructors, which promotes higher level thinking skills.

Replication of Competencies

The use of technology and visual aids such as YouTube, pre-recorded videos, text, and PowerPoint presentations allow for reflection and enable students to benchmark competence in areas in which proficiency is sought. In the flipped model, students can review information materials prior to attending an in-classroom class which composes their prior knowledge before coming to class. In addition, some activities can be assigned and completed as they pertain to the instructional objectives. (Flavell 1979) suggests shared experiences are any conscious cognitive or affective familiarities that accompany and pertain to intellectual exchange which happens in flipped classrooms.

Time, Stage and Location

FIGURE 4
DOUBLE-LOOPED LEARNING (ARGYRIS 1991)



In (Argyris 1991) double-looped learning is introduced into the organization as imperative to successful business. We can apply this concept to the Flipped Classroom strategy. Both instructor and the learner receive constructive feedback (see Figure 4). Given the Flipped Classroom requires structure, the learning environment is important. The instructor will need to incorporate proficiencies to keep the students engaged. Most learners who are reviewing information prior to coming to class will need accountability. Allowing active learning to take place outside of class similar to hybrid or online learning techniques will require a means of formative assessment to evaluate student performance. These assessments will assist the educational leader in addressing the needs of the learners. (Meyers & Jones 1993) discuss the active learning process and instructional tools which keep the learning environment "active" those include problem solving exercises, cooperative student projects, informal group work, simulations, case studies, and role-playing as examples. (Argyris 1991) propounds that feedback is critical in business environments which would apply to classrooms. He refers to this as double-looped learning.

EPISTEMIC COMMUNITIES

The epistemic communities or knowledge communities have been described in (Foulcault 2002) as a group of people who meet regularly to create priorities in organizations. Foucault leads to the thought that an epistemic community co-constructs those priorities. (Mupepi 2010) develops organizational strategy hinged on an epistemic community. For example, organizational efficiency and effectiveness can be advanced by a knowledge community. Mupepi gives the analogy of the Adam Smith pin production factory showing the division of labor. Adam Smith proposes that the division of labor into specialization units which can yield increased productivity. By determining the desired capacity and the set of skills that capture what the organization does best using appreciative inquiry (AI), the entire organization can advance to the next level. Adam Smith envisioned increased ratio of output as each man perfected his act. AI, a change management method can be deployed to determine the skillfulness required in avoiding wasted time and efforts. The AI methodology makes it possible for the entire organization to participate in the determination of what needs to be changed making it possible to distinguish between efficiency and effectiveness. It is essential to make this differentiation because successful corporations are both efficient and effective. By drawing from the Adam Smith pin-making enterprise, learning the best methods used to perfect the acts of different specialists, can be documented and communicated to all members of the epistemic community. Feedback in all the practices is imperative to developing specialist. The Flipped Classroom offers the opportunity to co-construct curricular by sharing experiences and drawing lessons from the instructors' syllabus.

THE IMPACT OF COMMUNICATIONS

In (Barrons 1993) organizational communications are viewed as critical to effective learning. In later research, (Mupepi, Mupepi & Motwani 2015), posit that the centricity of organizational learning is clear and concise communications. In the Flipped Classroom, there should be an all-around communication among students and the instructor as they share information and experiences. Barrons suggests that the environment nowadays includes information from the media, social networks and prevailing cultural trends. For example, if students attended a concert they would discuss the performance in class. This reflects that learning continued outside the classroom. Learning was influence by the motivation from this experience. Mupepi et al, argue that the relationship between skills acquisition and motivation is highly correlated.

Instructors Role

(Barrons 1993) considers the instructor is central to all to all the activities in the (flipped) classroom. The role of the instructor is still central in the reductions of dropouts and to increase the skillfulness of higher order learning. Barrons argues that the most critical problems of all times is to address the problem solving skills of each student. (Chall 1983) the scripts of Sesame Street which serves as an informal television classroom for pre-school children up to age 5 (Vygotsky & Bandura) were change to incorporate problem-solving skill development. In much later research (Jacobs & Chall 2003) argue that the developmental stages of reading development, reading is conceptualized not as a process that is the same from beginning stages through mature, skilled reading, but as one that changes as the reader becomes more able and proficient. Therefore, problem solving is a developmental skill. In the flipped classroom, group exercises constitute problem solving and the conceptualization of explicit practices in the relation to co-constructive epistemology.

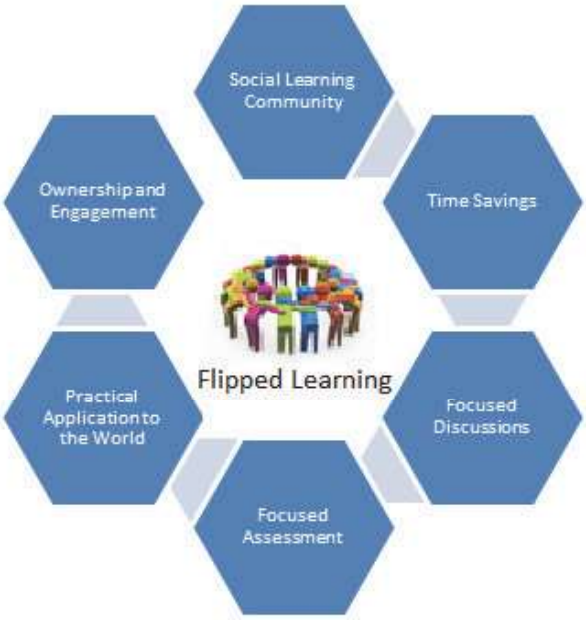
One of the responsibilities of the instructor in the flipped classroom is dictate notes to students. This exercise enables the student to continue to develop their language arts skills. (Lave 1988) suggests that there is a correlation between writing and memory. In the flipped classroom, it is important as students share information they write down what they want to remember. Lave argues that apprentices in the field of electrical engineering took notes as they saw the instructor provide demonstrations. In their final

assessment, they were required to repeat those demonstrations. From the notes, they remembered the demonstration were learned in the classroom during the final exams.

The Way Forward

Looking ahead, the concept of the Flipped Classroom strategy as applied to pedagogical models will continue to open alternatives to the learning community. Effective instructors are looking for ways to provide the highest levels of achievement to their students. In business alike, the process of learning continues in a similar manner when it comes to new tasks. Learning that has high-level relevance to the participants provides a high-level of engagement. Using the flipped strategy allows one to apply real world problem solving experiences by adding a high level of relevance to the process of developing explicit practices from tacit knowledge. In Figure 5 a practical model shows how flipped learning will move forward the pedagogical process. However, this can only be done if one consider all the variables in this discourse and believing that the overall goal is to improve instruction.

FIGURE 5
THE MAKING OF THE EXPLICIT PRACTICES



CONCLUSION

One can continue to observe achievements as organizational learning continues as a process of creating, retaining, and transferring knowledge within an organization as applied to the Flipped Classroom to develop explicit practices. Thus, an organization improves as it gains experience. These experiences allow one to create knowledge and increase motivation for learning. The Flipped Classroom is an example by which learners have the opportunity to experience learning in a different approach by past standards were traditional models included in class lectures and assignments after class sessions. One can look back at the pedagogical standards which have historically lead pedagogy to where it is today. A Flipped Classroom, does not have a standard framework, however, there are many ways in which a classroom can be "flipped. This article has offered only just one of the many approaches to learning in organizations.

REFERENCES

Argyris, Chris (1991). Teaching Smart People How to Learn. *Harvard Business Review, May-June pp. 99-109.*

Bandura, A. (1977). Social learning theory. Englewood Cliffs, NJ: Prentice-Hall.

Barrons, Kevin P. (1993) *Whittle Communications Channel One: The Effects of News and Advertising on Secondary Students.* Unpublished Ph.D. Dissertation. Detroit: Wayne State University.

Chall, J. S., & Jacobs, V. A. (2003). Poor children's fourth-grade slump. *American educator*, *27(1), 14-17.*

Chall, J.S. (1983) *Stages of Reading Development.* New York: McGraw-Hill.

Flavell, John H. (1979). Metacognition and Cognitive Monitoring: A New Area of Cognitive-Developmental Inquiry. *American Psychologist. Vol. 34, No. 10, 906-911.*

Foucault, Michel (2002). *The Order of Things: An Archaeology of the Human Sciences.* London, U.K.; Routledge classics. Psychology Press.

Fraser, Kelly (Dec. 7, 2006). Why doesn't The University of Michigan have snow days? *The Michigan Daily News.*

Jenkins, Chris (Feb. 02, 2009). The Australian Financial Review - ABIX via COMTEX -- SAP will supply software for a large revamp of Woolworths' merchandising systems.

Lave, Jean; Wenger, Etienne (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press. ISBN 0-521-42374-0.; first published in 1990 as Institute for Research on Learning report 90-0013

Lave, J. (1988). *The culture of acquisition and the practice of understanding* (pp. 259-286). Palo Alto, CA: Institute for Research on Learning.

Meyers, Chet; Jones, Thomas B. (1993) Promoting Active Learning, Strategies for the College Classroom. San Francisco: Josey-Bass.

Mupepi, M.G. (2014). Can the Division of Labor Be Re-Engineered to Advance Organizational Dynamism? SAGE Open, 05/2014, Volume 4, Issue 2 pp.1-6.

Mupepi, Mambo (2010). Appreciating social structures: a strategy for advancing the efficiency and effectiveness loci in organization. *International Journal of Education Economics and Development 2010 - Vol. 1, No.4 pp. 306 - 319.*

Mupepi, Mambo; Mupepi, Sylvia; Motwani, Jaideep (2015). Social Construct: Methods, Tools, and Applications in Re-Engineering Organizations. *The Proceedings of the MBAA International Conference March 25-27. Chicago.*

Roehl, A., Reddy, S. L., & Shannon, G. J. (2013). The flipped classroom: An opportunity to engage millennial students through active learning strategies. *Journal of Family & Consumer Sciences*, *105*(2), 44-49.

SAP.COM (2015 a). SAP grows up, but never grows old. Accessed 05/29/2015.https://www.sap.com/careers/about-us/history.html

SAP.COM (2015 b). SAP at a glance: Company Information. Accessed 06.02.2015. http://www.sap.com/corporate-en/about/our-company/index.html

Senge, Peter, M., Art Kleiner; Charlotte Roberts; Richard Ross; Bryan Smith. (1994). *The Fifth Edition Fieldbook.* New York: Doubleday Books.

Vygotsky, L. (1978). Interaction between learning and development. *Readings on the development of children*, *23*(3), 34-41.