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Message from the Editor-in-Chief

Hello from TOJNED

TOJNED welcomes you. TOJNED looks for academic articles on the issues of education science and may address assessment, attitudes, beliefs, curriculum, equity, research, translating research into practice, learning theory, alternative conceptions, socio-cultural issues, special populations, and integration of subjects. The articles should discuss the perspectives of students, teachers, school administrators and communities. TOJNED contributes to the development of both theory and practice in the field of education science. TOJNED accepts academically robust papers, topical articles and case studies that contribute to the area of research in education science.

The aim of TOJNED is to help students, teachers, school administrators and communities better understand the new developments about teacher education. Submitted articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJNED. TOJNED provides perspectives on topics relevant to the study, implementation and management of learning with technology.

I am always honored to be the editor in chief of TOJNED. Many persons gave their valuable contributions for this issue.

TOJNED and Sakarya University will organize the INTE-2019 (www.int-e.net) in July, 2019 in Prague, Czech Republic.

Call for Papers

TOJNED invites article contributions. Submitted articles should be about all aspects of teacher education and may address assessment, attitudes, beliefs, curriculum, equity, research, translating research into practice, learning theory, alternative conceptions, socio-cultural issues, special populations, and integration of subjects. The articles should also discuss the perspectives of students, teachers, school administrators and communities.

The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJNED.

For any suggestions and comments on the international online journal TOJNED, please do not hesitate to fill out the comments & suggestion form.

April 01, 2019

Editor,
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ADDRESSING PRESERVICE TEACHER'S DISJUNCTIVE KNOWLEDGE AND CORRESPONDING BELIEFS REGARDING GUIDED-DISCOVERY BASED PEDAGOGICAL PRACTICES

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ABSTRACT
This study assesses pre-service teachers' understanding of Piagetian theory, how these teachers-in-training would implement and execute discovery-based and guided-discovery based lessons, as well as their preferred pedagogical practices, before and after having participated in both didactic and an immersive guided-discovery based lesson. Within both, linkages between theory and practice were explicitly made in reference to disequilibration, assimilation, accommodation, schema development, re-equilibration, and related topics. Results indicate that by the end of the course, pre-service teachers' were reliably able to discern whether a task was more assimilative versus accommodative; they also demonstrated accuracy in their conceptions of what constituted disequilibrating events. Students' descriptions of how they would "facilitate" their students' active construction of knowledge however, revealed several misconceptions and a superficial understanding of how these theories intersect with practice. Additional data that were culled pertaining to students' theories about science teaching revealed a marked stability in beliefs regarding preferred pedagogical practices. Discussion, implications, and suggested future research are provided so this immersive experience can be replicated, and augmented by concept teaching, to foster positive outcomes for pre-service instructors and the students they will serve.
Keywords: pre-service teacher preparation, Piagetian theory, reconciling theory with practice

Introduction

Teachers are now required to educate K-12 learners in rapidly changing knowledge-based era with increasingly challenging academic standards (Darling-Hammond, 1998). To meet these goals, and do so for an increasingly diverse student population, educators must cultivate a complex array of skills. These include facilitating their students' ability to detect discrepancies in the material they are learning, gather evidence that enables them to reconcile these disparities, and formulate increasingly accurate – and more elaborate – knowledge schemes. These facets of – what Shulman (1987) operationalized to be -- pedagogical content knowledge are, in part, cultivated and informed by tenets of Piagetian theories (Karplus, 1977; Hancock & Gallard, 2004; Korthagen & Kessels, 1999; Tobin, Tippins, & Gallard, 1994). However, data indicate that preservice teachers struggle to "transfer" these theoretical understandings into practice, thereby diminishing their capacity to facilitate their students' mastery of higher-order learning objectives. This is significant, given research indicating both the need for more effective, student-directed K-12 STEAM instruction, as well as the resource limitations affecting lower income districts (Thorley & Stofflett, 1996; Tessier, 2010).

Specifically, data derived by the authors indicated that preservice teachers taking an introductory course, on theories of learning and teaching and their application to serving learners whose families are economically disadvantaged, had – in the best circumstances -- predominately "knowledge and /or comprehension-based" understandings of Piagetian theory and guided-discovery based pedagogical practices, and in the worst, incorrect/nebulous understandings. These findings suggest it is important for teacher educators to explore how to train teachers to do more than define theories surrounding student-directed learning. Instead, they need to understand how, and when, to put those theories in practice.

To address this extant question, in this study preservice teachers actively participated in two, guided discovery-based lessons, of nominal cost to execute. While doing so, they defined what disequilibrating events "looked

like," how they attended to them by assimilating and accommodating new information, what it "looked like" to re-equilibrate to a higher cognitive level, how their schemas changed, and exactly how the teacher – in this case a Director of Instructional Technology – facilitated their learning. These preservice teachers' knowledge of Piagetian theory was assessed -- after a didactic lesson on schema formation, teacher-as-facilitator, assimilation, accommodation, disequilibrium, and re-equilibration -- prior to this immersive experience, and again, after the immersive experience. Also assessed were student's beliefs regarding which pedagogical practices would be optimal to enact in response to a set of instructional scenarios, both before and after having participated.

Literature Review

Learning is a process of conceptual change. Piaget uniquely added to our understanding of this process by asserting that, for students, "learning is in the doing," and as such, their active reconciliations between what is believed to be true and disconfirming evidence facilitates the cultivation of their qualitatively more sophisticated knowledge schemes (Piaget, 1974). These epistemic and pedagogical beliefs are of relevancy to teachers-in-training, who are reconciling their former experiences as a K-12 student with theories of learning and teaching. Their "compartments of learning" informed by personal experience may compel them to view inquiry-based pedagogy as primarily a science-specific teaching tool that is superior to direct instruction (Posner, Strike, Hewson, & Gertzog, 1982; Cobern, Schuster, Adams, Skjold, Mugaloglu, Bentz, & Sparks, 2014). This is consequential: Thomson & Gregory (2013) report that teachers' pedagogical beliefs are tied to their classroom practices. Thus, if their beliefs are not accurate, it is incumbent upon teacher trainers to clarify these misconceptions through various means, which remain unclear.

Clarifying Process of Disequilibration, Assimilation, Acccommodation, and Re-equilibration

Preliminarily, clarification necessitates understanding that problems or cognitive challenges – called disequilibrating events -- emergent in learners' active engagement usually requires them to 1) assimilate new phenomena into existing theory, while concurrently 2) conceptually reorganizing or accommodating their previous understanding. This process is often non-linear and recursive in nature. When a student has reconciled discrepancies to facilitate new, coherent understandings, their re-equilibration to a higher cognitive level is indicative of conceptual change (Posner et al., 1982, Piaget 1930, 1974).

Pertaining to conceptual change. What conditions are necessary for conceptual change? First, a learner must be dissatisfied with a current theory – scientific or otherwise. Posner et al. (1982) asserts that this occurs when learners either detect an anomaly or confront assumptions that are discrepant with those previously held. Second, as defined by Piaget, learners respond to/are not dismissive of a disequilibrating event. Third, "Responding" requires learners to search for intelligibly represented, plausible, and/or fruitful conceptions (Thorley & Stofflett, 1996, Piaget 1930, 1974). The implications for preservice teachers, who wish to facilitate their students' reconciliation between what they know/believe disconfirming evidence, is that they must clearly understand the prerequisites for learners' engagement in conceptual change.

Pedagogical methods used to foster conceptual change. The process of conceptual change is intrinsic to discovery-based learning, which Guthrie (1967) reports is a maximally effective way to facilitate students' transfer of knowledge. Another benefit of problem-based pedagogical practice – which is not synonymous with yet share features with discovery-based learning – is its value in fostering students' integration of new concepts, a result not evidenced by those taught through traditional, didactic means (Capon & Kuhn, 2004, Posner et al., 1982, Thorley & Stofflett, 1996)

As alluded to above, however, despite these assertions, as well as Piaget's singular endorsement of student-directed learning, positive student learning outcomes have resulted from teacher-directed instruction. Cobern, Schuster, & Adams (2010) report that use of both pedagogical models for teaching science, direct instruction and inquiry instruction, resulted in students' performing equivalently as per their post-test scores. Thomson & Gregory (2013) also reiterated the positive student learning gains associated with teachers' use of direct instruction in tandem with a more hands-on learning approach.

Given the academic research indicating the strong, positive association between the degree to which teachers have integrated, elaborate knowledge of guided-discovery pedagogical practices and their students' substantive conceptual understanding (Magnusson, 1991; Bellamy, 1990); evidence indicating the preponderance of K-12 lessons that are transmissive in nature, with minimal guided-discovery based learning opportunities (Banilower & Smith, 2013); and, limited opportunities to refine pre-service teachers' pedagogical content knowledge due to time constraints in methods and related coursework (Cobern, Schuster, Adams, Skjold, Mugaloglu, Bentz, & Sparks, 2014), the authors had preservice teachers, after having reviewed Piagetian theory in class, participate in an immersive, hands-on learning experience entitled, "Inquiry learning in the Classroom Using Technology." As

noted previously, students' knowledge of Piagetian theory was assessed after an in-class, didactic lesson prior to this immersive experience, and again, after the immersive experience. Also assessed were student's beliefs regarding which pedagogical practices would be optimal to enact in response to a set of instructional scenarios, again -- both before and after participating in Inquiry Learning in the Classroom Using Technology.

Accordingly, the **Research Questions are:**

1. Does the conceptual integration and understanding of Piagetian theory as well as guided-discovery based lessons change after preservice teachers have engaged in two immersive, guided-discovery learning experiences, and if so, in what ways?
2. Do preservice teachers preferred pedagogical approaches, in response to several, realistic science scenarios (i.e. "Thinking About Science Teaching, available at **http://www.wmich.edu/science/inquiry-items/index.html** **[Appendix B]**) change after preservice teachers have engaged in two immersive, guided-discovery learning experiences, and if so, in what ways?
3. What are the preferred pedagogical approaches in response to several realistic science scenarios (i.e. "Thinking About Science Teaching, available at **http://www.wmich.edu/science/inquiry-items/index.html** **[Appendix B]**) and what are some of the reasons for these preferences? Are explanations for having chosen preferred pedagogical methods consonant with the preferred pedagogical methods chosen?

Our work addresses a key aspect of these extant questions by examining the associations between preservice teachers' depth of understanding Piagetian theory and guided-discovery based learning, preferred pedagogical practices, and rationales for these preferences. If preservice teachers are being trained to facilitate their K-12 students learning, and if the degree to which their conceptual understanding of guided-discovery based learning is positively associated with their K-12 students levels of understanding, then how do we cultivate substantive, integrated knowledge schemes of these practices?

Methods

In this study, participants included pre-service teachers enrolled in a sixteen-week three-credit hour Educational Psychology Course with an emphasis on serving learners in poverty at a small university located in suburban area within the southeastern United States. All students ($n = 48$) were Education majors in their freshman or sophomore year of undergraduate study. The relative proportion of males to females, as well as African American and Caucasian students in this study mirrors the larger population of pre-service teachers in this program. A prerequisite to the course was successfully completing a three-credit course focused on the fundamentals of education.

Context of the Course

Study participants were matriculates in a 200-level course, taught in-person with a corresponding 21-hour field component, focused on exploring the multifaceted development of learners from preschool to adolescence. Grounding student participants' emergent understandings of course content were the theories and tenets of Educational Psychology. Theories from this academic literature base, as well as those illustrating the intersection between theories of learning and teaching with the unique needs of learners in poverty – particularly those residing in rural areas, were examined extensively in class and in the field.

Procedures

First, preservice teacher participants learned, through didactic means, Piagetian theories and developmental stages, including assimilation, accommodation, teacher-as-facilitator, disequilibrating experiences, re-equilibration, characteristics of various developmental stages – such as conservation of matter and reversibility -- and how students construct knowledge. It is important to note that throughout the entire lesson/s, the authors explained the relative efficacy of using guided discovery pedagogical methods, as opposed to the unguided discovery-based learning methods endorsed by Piaget. Thus, these preservice teachers were applying Piagetian theories of learning and teaching, yet doing so in reference to guided-discovery based lessons. They were then asked to respond to a series of reflections – described in the "Measures" section below – and to indicate how they would teach a lesson in response to scenarios within "Thinking About Science Teaching," (Cobern et al., 2014 [Appendix B]).

Second, they participated in the lesson in the Instructional Technology Center (ITC), which commenced with the ITC Director asking students to describe their knowledge of specific theories of learning and teaching. To that end, she asked, "What is adaptation?" "What learning processes are intrinsic to adaptation?" "What is assimilation and accommodation?" "What is a disequilibrating event or experience?" "What is a knowledge scheme – what does it 'look like' or how can we conceptualize it?" "Let's think about the Hierarchy of Learning in Bloom's taxonomy?" What learning goals are at the lower levels of the pyramid?" "What learning levels are at the higher end of the pyramid?" "What might it 'look like' for students to 'create' as opposed to 'comprehend'?"

Third, after this introductory discussion, the class was randomly divided into two groups. One-half of the class was asked to create a product within the context of a budget, height requirements and other parameters (entitled, "Economics – Wants and Needs, Goods and Services"), while the other was asked to program Mbots (entitled, "Math – Distance, Speed and Measurement") to perform tasks that are described in detail – along with field notes (please see Appendix C). By the middle of the class period, groups (of preservice teacher participants) completed their activities and went to the other side of the ITC (i.e., those who completed "Math –Distance, Speed and Measurement worked on "Economics – Wants and Needs, Goods and Services" and vice versa).

No more than twenty-four hours after having participated in the immersive experience described above, participants were asked to complete a different version of "Thinking About Science Teaching," (Cobern et al., 2014 [Appendix B]), which included three questions that were the same as the first. Participants were also provided with an opportunity to substantively describe the reasons by their answers, for extra credit. Approximately 20% of participants (N=10) chose to do so. Finally, all participants were asked – through an open-ended question on their final exam -- to describe how they would facilitate their students' active construction of knowledge.

Measures

Prior to going to the Instructional Technology Center (ITC), yet after having studied in class the developmental stages Piaget operationalized, as well as assimilation, accommodation, disequilibration, re-equilibration, schema formation and teacher-as-facilitator, students were asked to respond to the following prompts:

In thinking about Howard Gardner's Theory of Multiple Intelligence (MI), Piaget, Vygotsky, Maslow, the Jensen text, Stereotype Threat, and Identity (Erikson) how do these concepts intersect with experiences you have had in your own life or things you have observed in the field as of late? While doing so, be sure to describe how these experiences and observations are linked to concepts in the Jensen text or according to the theories we have learned.

Based upon what you have learned regarding identity, best practices in teaching, and MI theory, what are some of the key behaviors you will enact or techniques you will use while in the field for this course, or when you become a practitioner (either in teaching, coaching or guidance counseling)? Please be as specific and comprehensive in your description as possible.

Preceding their participation in the ITC, preservice teacher participants also completed Cobern et al.'s (2014) assessment, "Thinking About Science Teaching," a 16 item, multiple-choice measure designed to both foster students' understanding of and reveal their preferences for using specific pedagogical approaches. Two different versions of this measure were used, one for the pre-test and another for the post-test. In both versions student participants were asked to read an instructional scenario and indicate, of the four instructional approaches -- on a continuum varying from direct instruction to inquiry instruction --, "Which one would be most similar to what you would do?" (see Appendix B) Notably, all of the pedagogical approaches were sound. The four options from which participants could choose one were:

- didactic direct instruction (teacher engaged in direct instruction with the provision of examples and/or demonstrations, but no student activities);
- active direct instruction, (teacher directly teaching the science content while incorporating corresponding student activities);
- guided inquiry (teacher facilitating his/her students' active discovery of science concepts); and,
- discovery-based (student inquiry-based learning with little to no teacher guidance) (Cobern et al., 2014).

Presented differently per each scenario was the order of each instructional approach.

The author's took field notes of all participants' behaviors and stated responses in the ITC, and – as noted above -- student participants were offered extra credit if they submitted substantive descriptions of why they chose each answer on the "Thinking About Science Teaching" measure (Cobern et al., 2014. A subset of participants did so on two occasions, that is, both prior to participating -- in the immersive learning experience -- and then afterwards.

Finally, all student participants were asked to answer the following questions on their final examination: "Describe how you would "facilitate" your students' active construction of knowledge for a specific lesson in the discipline you will be teaching (as defined by Piaget). What would you do? How would you do it?"

Data Analyses

At both time points, that is – after having learned about Piagetian theory didactically, prior to the immersive experience and then again afterwards, descriptive statistics of participants' responses on "Thinking About Science Teaching" were calculated (each nominal response was recoded numerically). A Wilcoxon matched-pairs signed-

ranks test was also computed to compare the scores on students' responses to "Thinking About Science Teaching" time one to their scores time two. In addition, participants' self-generated rationales for their answer choices, field notes documenting their responses while participating in the ITC, as well as their responses to the question posed regarding how they would facilitate a guided-discovery lesson, were qualitatively analyzed. Analysis was conducted using constant comparative analysis to detect emergent themes (Strauss & Corbin, 1998) that could be triangulated with numerically coded nominal data.

Results

Time One Reflections (prompt in Appendix A)

The dominant themes fell into two, broad categories. The first was that *any* kind of active learning, didactic active, generating an explanation, and the like, were all consistent with Piagetian theory – according to the students. The second was that the features of Piaget's theories were understood (by the students) in a disjointed, non-conceptual way (some of their quotes include statements such as: "I will facilitate the [my k-12] students," or a technique I plan to enact as a teacher is "schema-knowledge frame," or I plan to have "more assimilative learning" [instead of accommodation]). Weaved within all of this was a preference for active learning as a way for students to "remember" the material and be motivated/curious; this was reflected in their explanations for preferred pedagogical approaches in response to the scenarios.

Enumerated below are specific quotes illustrative of the themes listed above:

My main key behavior that I will enact while in the field or in my own classroom is student engagement and motivation. I will do my best to make sure my students are all involved and not just "fitting in" but they know what is going on. This way I will be using Piaget's theory and making sure that all my students are being involved regardless if the other people are more skilled.

During the field study, I also noticed how the teacher was incorporating Piaget's theories when he said that teachers give students information and the students just add the information to what they already know. For example, the teacher was teaching the students about George Washington. She gave them information on him then showed them a $1 bill so that they could see that he was on it. Some students may have already seen a $1 bill before and know what is it, but they didn't know that it was George Washington on the front of it.

Based of[n] the various theories, as a teacher, I would practice Piaget's Pedagogical Practices. He suggests that teachers should expose children to objects and experience and motivate them by stimulating curiosity. I would incorporate this in teaching my students by allowing them to do hands on activities instead of always doing book work or sitting down at a desk. To incorporate experience into learning I would try to take them on field trips or go outside as much as possible to explore if we are having a science lesson. I would also try to keep the students engaged as much as possible so that they can be curious about the topic and want to learn more about it without me having to force them.

Time Two Responses (prompt in Appendix A)

Results indicate students were reliably able to discern whether a task is more assimilative versus accommodative. When presented with the conservation of liquid, students identified this correctly, and, students demonstrated accuracy in their conceptions of what constituted disequilibrating events in the context of their immersive experience in the ITC. The latter is noteworthy: Understanding what "it looks like" and even "feels like" to attend to a disequilibrating event is important if pre-service teachers are to structure experiences that require students to re-equilibrate at a higher level of understanding (Mascolo & Fischer, 2005). Arguably, participation in the Inquiry learning in the Classroom Using Technology lesson bridged a potential gap between theory (disequilibrating events) and practice (envisioning what cognitive dissonance "looks like"). However, when asked, "Describe how you would "facilitate" your students' active construction of knowledge for a specific lesson in the discipline you will be teaching (as defined by Piaget). What would you do? How would you do it? Their answers indicated the following:

Overall, these pre-service teachers' conceptions of guided discovery is that it is "active" and "motivating to students," which is not inaccurate, yet their self-generated descriptions of guided-discovery were not always consistent with how that pedagogical practice is enacted. In addition, as per student responses to this assessment, the ways teachers facilitate student learning in the context of guided discovery are broadly defined and, again, not always consistent with how the facilitating of student learning was operationalized by Piaget.

Enumerated below are specific quotes illustrative of the themes listed above:

As a teacher, I would 'facilitate' my students by using a guided discovery based learning and by assimilation and accommodation. I would provide anything that would aid me in teaching and relaying the concepts to the students

in the best way possible. If one student did not understand, I would change my scaffolding techniques with that student and do what is best for him. I would use assimilation by providing background information and relating it back to what we are learning that day. Maybe one of the students did not understand the math problem because I was talking about animals and he was absolutely afraid of animals, I would change the topic to ensure he understands. However, some disequilibrium is okay in the sense of it is making them think and think critically. So, I would use accommodation by giving the students objects and situations that would cause a negative response to allow them to accommodate.

In the example above, a few misconceptions stand out. First, the preservice teacher is not inducing assimilative and accommodative processes in his or her student, rather he/she is "using" assimilation and accommodation. Scaffolds, while helpful to integrate, are not part of Piagetian theory per say, illustrating the way Vygotsky's theories of teaching are conflated with Piaget's. Again, the preservice teacher plans to "use assimilation," yet accurately notes that this process involves the students' integration of that which is known with new, information so his/her schemas are increasingly accurate, elaborate and conceptually congruent. The preservice teacher believes the presentation of a known topic to a student who may "[have been] absolutely afraid of animals," could be a disequilibrating event as a result of his/her fear. In response to this, the preservice teacher would "change the topic" so as to not hamper his/her understanding, yet note that the students' fear of animals could be an opportunity of sorts, fostering critical thinking. Finally, the preservice teacher-as-facilitator would "use accommodation" to cause a negative response (presumably disequilibrating) that "allows them" to "accommodate."

Active didactic. Notably, "active didactic" was the pedagogical approach participants most frequently indicated they would be likely to implement. In their self-generated descriptions of what it would look like to facilitate student learning via guided-discovery based approaches, they indicated the hallmark features were, "Moving around the room, not just sitting/listening" or "Cutting out shapes to show the phases of the moon." Also mentioned was, "doing an activity on a website," or "giv[ing] them manipulatives instead of having the teachers stand up at the board. In sum, "get up and move, that is 'do activities,' as opposed to being lectured to." This suggests that preservice teacher participants' conflated guided discovery-based learning with active didactic approaches and often view the merits of the former as better than expository or other approaches, such as "open inquiry based lessons" because it is beneficial for students to "do things" and move around the room – yet, unlike open inquiry, students should be told "what to do." (E.g., cut out the phases of the moon.) Facets of this are accurate – presumably according to Piaget, where the learning is in the doing, however, facilitating students' active construction of knowledge is not merely a function of whether students are moving around the room according to a teachers' instruction while studying a particular topic.

Also noteworthy were participants' self-generated definitions of what it means to facilitate their students learning. Often cited was providing students with autonomy, not being overly prescriptive, and/or not providing them with instructions – consistent with discovery-based learning endorsed by Piaget, but not congruent with the focus of our inquiry-based experiences in the ITC, which were guided-discovery lessons. For example:
I would facilitate my students' active construction of knowledge for a specific lesson in the discipline that I will be teaching by only answering the need to know questions. I am not going to stand over each student and hold their hand as they move on to the next set of instructions.

I would tell the students what they would be experimenting and what they need to find, but I will not tell them how or the outcome. If I wanted them to determine how slope, mass, distance, and acceleration are connected, I would tell them to find that out. I would give them the tools they need. There will be no instructions.

These data support the notion that facets of preservice teachers' knowledge of how to construct a guided-discovery based lesson is on the "knowledge" and "comprehension level" of Bloom's Taxonomy. Evidence of this includes preservice participants' assertions that guided-discovery entails students using tools conferred by the teacher, but their teachers will not "hold their [students] hands." Thus, their understanding of Piagetian theories of learning and teaching, as well as guided inquiry based learning, are not the level of application, despite having participated in guided-discovery based lessons and having generated accurate examples of disequilibrating events.

Results of Preferred Pedagogical Practices, Time One (scenarios available at: http://www.wmich.edu/science/inquiry-items/index.html [POSTT 2])

All participants preferred either "Didactic Active" pedagogical approaches or "Guided-Discovery Based" practices; infrequently chosen were "Didactic Direct" or "Open Inquiry-Based Lessons."

Results of Preferred Pedagogical Practices, Time Two (scenarios available at: http://www.wmich.edu/science/inquiry-items/index.html [POSTT 4])

As evidenced time one, all participants preferred either "Didactic Active" pedagogical approaches or "Guided-Discovery Based" practices with the exception of responses to one scenario regarding how to best teach Boyle's Law, in which students almost unanimously preferred use of a "Didactic Direct" pedagogical approach (the scenario pertaining to Boyle's Law will be presented). As noted above, infrequently chosen were "Didactic Direct" or "Open Inquiry-Based Lessons." Repeated between time one and time two were three scenarios. No statistically significant differences -- as per Wilcoxon Signed-Rank Test -- between preferred pedagogical practices emerged.

Discussion

The stability of teachers' beliefs has been documented and is consonant with psychological research indicating the proclivity of attitudinal resistance to change (Nettle, 1998; Kagan, 1992) Nonetheless, the authors believe, as per the results, that concept teaching methods would be an effectual correlate to the immersive learning experience described. The reasons for this is that concept teaching mitigates students' tendency to make classification errors – evidenced by participants in this study -- such as "overgeneralization, misconception and undergeneralization" (Tennyson & Cocchiarella, 1986, p. 40). The concept-teaching model, adapted to facilitating preservice teachers' understanding of Piagetian Theory, discovery-based learning, and guided-discovery based learning would include the following:

Elaborately defining the characteristics of each theory and pedagogical approach;

Providing explicit, examples of each that are accessible and familiar to pre-service teachers (without adulterating their meaning);

Presenting numerous explicit, examples of each that are accessible and familiar to pre-service teachers (again, without adulterating their meaning);

Facilitating a discussion among preservice teachers regarding why one representation was an example, and why another was not (that is, what aspects characteristics of the example are consonant with the definition, and what aspects of the non-example are not?)

Requiring students explain when these theories and pedagogical techniques are used as well as how they are implemented (Merrill & Tennyson, 1977).

For example, a concept-teaching lesson on the vocabulary term hirsute would include the following. First, the teacher would define the term hirsute, its parts of speech, and provide a visual representation of something that is shaggy or hairy. Second, the teacher would provide several visual examples of people, animals or other "things" that are hirsute. Third, the teacher would provide several visual examples of people, animals or "things" that have hair, but are not hirsute. That is, the teacher will provide non-examples and students will have to describe why each example is not consistent with the definition of hirsute. Fourth, the students would be asked to craft several sentences using the term hirsute, as an adjective, to clearly describe someone or something that is shaggy/hairy. These would then be reviewed for accuracy, so students are not apt to make overgeneralizations – anything with hair is hirsute; undergeneralizations – Godzilla is hirsute, but the man with a long beard is not; and misconceptions – all dogs are hirsute.

Suggestions for Future Research

Future research involves tracking our students' progress over time to establish their conceptual understanding of Piagetian theory, the intersection between these theories and practice, and their ability to create discovery and guided-discovery based lessons. This is important, as time constraints in science education courses, as well as the secondary priority science is given in the elementary school setting, render this research germane to examining effective ways to instruct pre-service teachers on how to integrate discovery-based learning into their lesson planning (Capon & Kuhn, 2004, Thorley & Stofflett, 1996).

Implications for Practice

The educational implications are twofold: initially, increasing the conceptual understanding of science standards for pre-service teachers using the notion of accommodation to influence this new conception is the first step. Strengthening the conceptual ecology of the pre-service science teacher will provide a foundation for the second goal, to apply effectual teaching methods to science and other content-area standards (Posner et al., 1982). These two goals can be accomplished through the intentional integration of concept-teaching, as was described above. Challenging the pre-service teacher's basic assumptions about teaching science – as well as other subjects -- and using the various types of instruction will foster a stronger conceptual understanding of theories regarding learning and teaching of centrality to those who are effective educators.

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Appendix A
Time 1 Reflection Prompt:
In thinking about Howard Gardner's Theory of Multiple Intelligence (MI), Piaget, Vygotsky, Maslow, the Jensen text, Stereotype Threat, and Identity (Erikson) how do these concepts intersect with experiences you have had in your own life or things you have observed in the field as of late? While doing so, be sure to describe how these experiences and observations are linked to concepts in the Jensen text or according to the theories we have learned. Based upon what you have learned regarding identity, best practices in teaching, and MI theory, what are some of the key behaviors you will enact or techniques you will use while in the field for this course, or when you become a practitioner (either in teaching, coaching or guidance counseling)? Please be as specific and comprehensive in your description as possible.
If you were to create a graphic organizer or diagram of your "future self" in contact with learners who are dealing with stressors or poverty, what would that look like/who will you be, given what you know now?

Time 2 Application-Based Question:
"Describe how you would "facilitate" your students' active construction of knowledge for a specific lesson in the discipline you will be teaching (as defined by Piaget). What would you do? How would you do it?,

Appendix B
Time 1 Scenarios: Thinking about Science Teaching (**http://www.wmich.edu/science/inquiry-items/index.html [POSTT 2]) - Example Below-**
Insert Figure 1 here
Time 2 Scenarios: **http://www.wmich.edu/science/inquiry-items/index.html [POSTT 4]) - Example Below –**
Insert Figure 2 here

Appendix C

To engage in "Economics – Wants and Needs, Goods and Services," preservice teachers were told the following in order to complete their first task:

"You just moved to a new town in Nevada called Stubbornville. After you arrived, you realized that there is only one store in the town, the Everythingorium. Surely this can't be! There must be a demand for more goods and services than this one store can manage.

"You decide to open a new store in this town across the street from the Everythingorium. Your store carries a wide variety of goods and services, however you notice that customers are set in their ways and won't venture into your store. "There must be ONE thing that they can't live without?" you think to yourself. "What is the one thing that I can carry in my store that the citizens of Stubbornville NEED to have? Maybe if I can get them in the store for this one item, they will realize that the other items I carry will be of value to them too. I have to make this work!"

"Ah-ha! I've got it! I will show the citizens that they can't live without a/an _____!"

"Now I need to go build one, to show the citizens just how important this item is. There's only one problem. I've spent all my money opening this store and I've only got $20 in my bank account. I need at least $10 to eat for the rest of the week, so it looks like I've only got $10 to spend on supplies for this nifty new gadget. It's a good thing my friend has a 3D printer and owes me a favor, and at least I have the Everythingorium across the street for some additional supplies."

Parameters:

- You must work in a group of 2 or 3 classmates
- You only have 10 minutes to build your gadget
- You MUST use one of the 3D printed items in your gadget
- Your gadget must be at least 6 inches long, wide, or tall
- You only have $10 to spend on materials. You must create a budget that shows how much you spent to build this item.

You will have an additional 5 minutes to:

- Determine the name of the gadget
- Determine the cost of the gadget (remember there is only $10 left in your bank account so you do need to make a profit)
- Create a slogan for the gadget that explains its purpose and uses its name
- Explain in a few sentences why someone would WANT or NEED the gadget
- Explain in a sentence or two why your gadget is a GOOD or a SERVICE

<u>Task II</u>

Once your gadget is created, you will roll one die to determine variables that might change your gadget. You will have 5 minutes to make the necessary changes.

If you land on:

1- Oh no! Your dog tried to eat the prototype of your gadget. You must take a piece off of your gadget. Adjust the price of your gadget if needed.

2- Oh no! There was a flood in your office and your gadget was ruined. Take 2 pieces off of your gadget. Adjust the price of your gadget if needed.

3- Oh no! The patent/copyright office called and said that your gadget has the same name as another gadget on the market. You must change the name of your gadget and rewrite your slogan. Adjust the price of your gadget if needed.

4- Congratulations! Your gadget is the most perfect item this town has ever seen! You don't need to make any changes. Adjust the price of your gadget if needed and then assist one other team with their changes.

5- Oh no! You forgot to add something to your gadget. Choose a piece from another team's gadget and add it to yours. Adjust the price of your gadget if needed.

6- Congratulations! Your gadget is almost perfect. You need one more item to make it complete. Choose an additional item from the Everythingorium and add it to your gadget. Adjust the price of your gadget if needed.

<u>Task III</u>

Once your gadget has been modified, there is another variable that you must overcome. Roll one die again. You will have 5 minutes to make the necessary decisions for your situation.

1- Oh no! The town has decided that your item is priced too high. What will you do next?

2- Oh no! The Everythingorium has an industrial spy and they were able to recreate your gadget and sell it for $2 less. What will you do next?

3- Oh no! Your store was robbed and almost your entire inventory of gadgets was taken. What will you do next?
4- Oh no! The citizens love your gadget a little too much and you can't produce them fast enough. What will you do next?
5- Oh no! Your 3D printer suppliers have increased the price for the 3D printed item in your gadget. What will you do next?
6- Oh no! One of the pieces on your gadget is a choking hazard for children under 5. What will you do next?

Task IV
After surviving these 2 variables, you will have 2 minutes to determine:
- What is the new cost (or same cost) of your gadget?
- Do you need to modify your gadget (You can only do this if you spent less than $10 originally to make your gadget)
- Do you need to change the marketing strategy (slogan) of your gadget?

Task V
You will have 2 minutes to plan and only 30 seconds to pitch your idea to the citizens of Stubbornville. Include the name of the item, the price, and the function.

Task VI
The other teams will listen to your pitch and determine if your item is a WANT (something they would like to have) or a NEED (something they have to have).

If your gadget is a WANT then you realize that running a store is not your destiny. You put a For Sale sign on the door, head out of town, and back to your parents' house where you live comfortably for several year.
If your gadget is a NEED then you are a successful business person and you continue producing new gadgets for your store, which you have decided to name Successtopia.

They were provided with the following materials: pipe cleaners, objects created from 3-D printers, blocks/other wooden pieces, small cylindrical bowls, feathers, and other random objects. Students were permitted to use a glue gun, however, use of the glue was costly and they had to create their products within the confines of a budget. As noted above, they had to create a novel, useful item that was no more than 6 inches tall, was sturdy, etc. As students worked with their partners (in pairs or triads) they would routinely pose questions such as, Will this stay? Is this too tall?

By the close of this first exercise, students created the following products: a backscratcher, air purifier, binoculars, scarecrow (owl) for rodents, and a tire swing. They were challenged to create names for the product, craft slogans, finish within a given time frame, and creating a product that is stable/does not fall apart.

Then, each pair of students was required to either overcome one of many possible obstacles, or fruitfully use an affordance such as the ability to "pirate" a piece from another groups' project. In order to do so, they were first asked to roll a die and see what the obstacle or affordance will be (as evidenced in the description above). Sample constraints include word from the manufacturer that they cannot produce the product quickly enough, and as such, are asking those who created the item to alter the product accordingly. Other "disequilibrating" events included having other groups take one "piece" of what the dyads created away from them for use in their projects. As was intended by the Director of the ITC, students altered their goals in response to having lost a part, while others added features as a result of having gained a part. In addition, once group members realized they would have to move their product (in order to hold it up and show it to the class), they grew concerned about its stability. Again, following this, each dyad had to present what they created and sell it to their peers.

Products included the "360 Degree Swing and Shine"; Scratch on the Go!"; "The Brakester 3000: Broom, Rake, and Duster – all in one"; the "Pocket Pooch: The Pooch you can't Leave Behind!"; "The Spaghetti Spinner 500"; and, the "Swing and Sway: For Barbies."

Consistent with the lesson guidelines above, after these products were presented/sold, the ITC Director asked the preservice teachers to vote on the product they are likely to need the most. She provided several prompts such as, "Explain why having such-and-such item is a need? Do these other products contribute to your quality of life? What about the backscratcher, why is that a need versus a want? Which is more of a need?"

At the same time, the other half of the class was working in the ITC to program Mbots, which are robot kits that can be programmed using a tablet. Preservice teacher dyads were provided with a tablet, an Mbot, a maze (taped onto the floor), and a furry object at the end of the maze. They were told that their Mbot would have to "find fluffy" and do so while remaining in the boundaries of the maze. In the context of this exercise, students detected reasons for unexpected outcomes or disequilibrating events. For example, bubbles in the carpet led to irregularities in movement that caused their Mbot to veer off- course, consequently causing them to hit a "wall" in the maze. Another dyad determined that its Mbot had its wheels on backwards and, as a result, would go in reverse when programmed to move forward, and turned when programmed to travel straight.

Direction for tasks one and two are listed below:
You will have 10 minutes to complete the following tutorials in their entirety.
1. Sequence
2. Speed
3. Loop
4. Stop
- Be sure to take turns with the iPad so that each of you have the chance to complete parts of the tutorial.
- As you work through the tutorials you will become **programmers** and create **algorithms** that tell the robot what tasks to carry out.
- If you make a mistake, you will not be able to move on to the next tutorial. When you make a mistake in programming, you **debug** the program to figure out where you made a mistake and determine how you can fix it.
- Use your recording sheet to note if there were any situations in which you did not complete the steps correctly. Make a note of what you and your partner did to **debug** the program.
- If you finish the tutorial before the 10 minutes are up, find the ITC GA and ask if you can move on to Task II.

Task II
You have lost your favorite stuffed animal and it's bedtime! You are supposed to be going to bed, but how can you sleep without Fluffy?? Your mom insists that you stay in bed, and you love your mom, so reluctantly you follow her wishes and stay in bed. But as you lie there tossing and turning, you realize there must be some way to get Fluffy back so you can sleep.

Then you have a brilliant idea! The mBot robot that you got for your birthday is just a few feet away. Tiptoeing quietly so as not to alert your mom, you open your bedroom door just wide enough for the mBot to slip out, then you grab your iPad from the nightstand and hide under the blanket. OK mBot- it's up to you to find my Fluffy!

Thankfully, you have the layout of the house memorized so you open the mBlock app on your iPad and begin creating an **algorithm** to find Fluffy.

- Click the blue arrow in the upper left corner of the app to get back to the main screen
- Click the CREATE icon in the middle of the screen at the bottom
- Use the MOVE, SHOW, and CONTROL blocks to build your algorithm

Oh wait! There is just one more problem. Your sister left her dirty socks all over the floor so you will have to navigate a certain pathway to find Fluffy. That pesky sister. OK, you take a deep breath and prepare to send mBot on the mission that can end world hunger, oops that's a little too dramatic. The mission will help you fall asleep since Fluffy will be back in your arms.

You will have 15 minutes to complete this task
- Choose an obstacle course in the main room of the ITC
- With your partner, use your **schema** (what you learned in the tutorials) and the process of **assimilation** to develop the algorithm that will rescue Fluffy.
- Try your algorithm
- If it does not work the first time, then use the process of debugging to figure out what your team did wrong and how you can fix it to get to Fluffy.
- Record your changes on the recording sheet
- Continue debugging until your robot has found Fluffy.

As noted above, after completing the first task, groups were required to program their Mbot so it would move according to a sequence of different speeds. In response to this, students deleted their programming, took/recorded measurements, and isolated variables to determine sources of variance. For example, they would determine the

angle at which the Mbot had to commence moving in order to reach the next part of the maze without hitting a wall.

Upon completion of these immersive experiences, the Director of the ITC asked students the following:

1. When did you build a schema?
2. When did you have disequilibrating experiences? For example, when you rolled the die, - what was an experience that was not so good? How did you adjust to that experience? Adaptation – made the product better. Notably, some disequilibrating experiences are/were positive.
3. When we started, at what level were we learning as per Blooms Taxonomy?
4. When we applied the knowledge where did that fall in the pyramid?
5. Where did our product development fall on Blooms Taxonomy?
6. How did you use math- measurement, scale, and probability in your work today? If you did this for a week, could you use this for a math class? What concepts could you bring into it?
7. What about English? What if students had to write a sentence about their products or procedures?
8. What other skills are required to perform these tasks? Students noted reading instructions and having to do the tasks in order where just some of the tasks/skills their k-12 learners would have to understand and perform.
9. How might these lessons address student learning outcomes in Science? Students responded by noting how speed, speed per distance, hypothesis generation, and making inferences were all components of these guided discovery lessons.
10. What about social studies? Students responded by noting how discerning wants, differentiating them from needs, examining economics, money, and budgeting would all be addressed in this lesson?
11. Then, the Director of the ITC asked, how did I serve as teacher as facilitator? In what ways/why were these lessons using guided discovery?

EDUCATING FOR CREATIVITY: A CHALLENGE FOR THE TWENTY-FIRST CENTURY

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Abstract
Over the last several decades educational reform has been a subject of intense discussions and debates in the United States and in other countries. Despite numerous proposals and initiatives, no major new direction has emerged, and the state of American education today is little different from where it was three decades ago. At the same time, there is a growing pressure due to enormous changes in many spheres of our life—most importantly in technology, information, and economy--to make our education more relevant to the demands of our time. The demand for creativity and knowledge is arguably the one that particularly stands out in modern society. As a result, the idea to make the process of creation and creativity more central to our educational practice is widespread. This article examines some problems that stand in the way of this change and offers the way to solve these problems. The article also outlines the contours on a new educational practice that centers on the process of creation.
Keywords: The process of creation, teaching, learning, equilibration, and production of disequilibrium.

Introduction

Since the dawn of the Modern era the idea of progress has been integral to our civilization. Constant advancement, improvement, and growth have been consistent and self-conscious pursuits in modern society. The result has been an unprecedented evolution that we have experienced over several centuries. The pace of change does not subside but continues to accelerate.

Education has been an important part of the progressive agenda. Changes in the way we educate our young have accompanied and productively contributed to every transformation of our society that we have experienced. Education played a crucial role in the transition to the modern industrial society by training the new labor force and preparing young people to become functioning and productive members of the emerging economic, social, and political order.

At the present time our civilization is undergoing a profound transformation that many describe as post-industrial. The rapidly expanding use of machines, robots, computers--all associated with what is called the artificial intelligence (AI) revolution--is increasingly replacing humans in performing various routine and non-routine tasks. We are still trying to come to grips with the full extent and impact of this revolution, but many argue that it will exceed in its magnitude all previous transformations.

The prevailing and widespread sentiment is that our educational system is not doing nearly enough to meet the needs of modern society and that education should play a very important role in the current transformation. Many education professionals, politicians, public figures and activists, business leaders, and government officials argue in support of stronger connections between our educational system and society at large (Holden, 2010; Laguardia and Pearl, 2009; Power, 2005; New Day for Learning, 2007; Hess, 2008; Prats-Monne, 2015; Tierney, 2013). This sentiment was the principal motivation for the neo-liberal reforms of education (A Nation at Risk, 1983; No

Child Left Behind, 2001; Race to the Top, 2009; Talburt, 2005; Sturges, 2015). The very same sentiment inspires also those who criticize neo-liberal reformers and advocate alternative approaches to education change (Rebertson, 2005; Carter, 2012; Suspitsyna, 2012; Verger and Bonal, 2012; Zhao, 2012).

There is no shortage of proposals for what should be changed and how. They deal with every aspect of our educational system: from governance and administrative structure to curriculum and conditions of employment, to teaching methodology and classroom dynamics. Some of them have been tried, but the results are not satisfactory. Several decades of hot debates have not produced anything approximating a distinct new direction for our educational system.

This article will focus on the process of creation as a major candidate for defining the new direction in American education that would meet the needs of the 21st century. It will examine controversies in the current educational practice relevant to creativity and discuss a possible solution. Finally, the article will outline the educational practice that integrates the process of creation as its central organizing principle.

Creativity and American Education

As has been mentioned, creativity has been and remains one of the major candidates for defining the new direction in American education. It is worth reminding that the need for technological innovation and entrepreneurship sparked discussions of educational reforms back in the early 1980s. In the wake of the stagflation crisis, the newly elected President Reagan reversed the priorities of the post-war consensus and introduced neo-liberal policies that were designed to restore American competitiveness and reassert the role of the U.S. as the world leader.

Initially, President Reagan and his government harangued the market forces that the new policies were supposed to enhance as the principal vehicle of change. However, as the miracle of the market forces began to wane, the government turned its attention to education and innovation as a solution for economic growth. In 1983, the special commission created by then Secretary of Education T. H. Bell published its report "A Nation At Risk: The Imperative For Educational Reform" that outlined the problems in the American educational system and made recommendations for addressing them. Among proposed steps the report emphasized the need to foster creativity and entrepreneurship in young people of America (A Nation at Risk, 1983).

The report sparked much activity and produced a flurry of proposals on how to improve American education. Several other efforts followed in the wake of the report: the standards movement that eventually morphed into the reauthorization of the Elementary and Secondary Education Act, better known as "No Child Left Behind" under President Bush, the Race to the Top program under President Obama, and the Common Core Standards Initiative. Although creativity under the guise of entrepreneurship was still part of the discussions related to reforms, pragmatic and specific issues--such as standards, competencies, administrative structure, and work conditions—largely overshadowed it. Eventually, discussions of educational practice focused on enhancing creativity were largely confined to the narrow domain of art and design education (Patston, 2018). As has been mentioned, despite decades of debates and discussions, the American educational system is today roughly where it was thirty years ago (AIR, 2018).

Discussions of education as a venue for fostering creativity go back to the 19th century when the ideas of German philosopher Friedrich Froebel and Swiss educator Johann Heinrich Pestalozzi attracted attention of prominent American educators, philosophers, and philanthropists including Elizabeth Peabody, Mrs. Horace Mann, Mrs.

Nathaniel Hawthorne, Ralph Waldo Emerson, the Alcott family, William Ellery Channing, and others (Feldman and Benjamin, 2006, p. 320). The 1960s and 1970s witnessed a revival of discussions on education and creativity largely under the influence of the ideas of Swiss psychologist and the founder of genetic epistemology Jean Piaget and later the cultural-historical theory of Russian psychologist Lev Vygotsky (Feldman and Benjamin, 2006). More recently discussions of creativity and education evolved along two largely disconnected tracks. Creativity has attracted a good number of psychologists who focus on trying to understand what creativity is, what personality traits contribute to enhancing creativity, and the conditions than make creativity possible. However, the impact of this theoretical research on educational practice, as noted by Feldman and Benjamin, has been "recognized as 'diffuse and ineffectual' despite the best intentions of psychologists and educators" (Feldman and Benjamin, p. 331).

At the present time creativity remains perhaps the only major idea that can potentially provide a new direction for American education. The well-publicized article "The Creativity Crisis" by Po Bronson and Ashley Merryman that appeared in *Newsweek* in 2010 reinvigorated discussions about the need to foster creativity in America (Bronson and Merryman, 2010). Contributors to these discussions stressed that our society needs to be more creative and innovative in order to solve the problems it faces in today's world (Thorp and Goldstein, 2010). Discussing the bleak prospects for the world economy, Eric Schmidt, CEO of Google, has expressed a view that succinctly summarizes what many business people, researchers, and politicians feel: "We are going to have to innovate our way out of this thing and our great research universities will have to lead the way" (Thorp and Goldstein, 2010, p. 1). Echoing a similar sentiment, Michael Porter has stressed that innovation and education should be an integral part of the overall economic strategy in America (Thorp and Holden, p. 1). Similar discussions are taking place in China and other countries (Starko, 2013, p. 54).

A large number of researchers and practitioners in the field of education raise the issue of the role of the educational system in fostering creativity and innovation in students (Schmidt, 2010; Swallow, 2012; Spendlove, 2008; Simonton, 2012; Shaheen, 2010). They recognize that creativity and innovation already have some place in our education. Many schools, colleges and universities offer courses in the arts that involve creativity. Many teachers engage in creative and innovative practices. However, critics feel that our educational system is not doing nearly enough in this regard. They call for a more central integration of creativity into our educational practice (Lamb-Sinclair, 2018; Berrett, 2013; Burnard, 2006; Coate and Boulos, 2012; Collard and Looney, 2014; Daud, 2018; Fischer and Golden, 2018; Guo and Woulfin, 2016; Haefeli, 2016; Henrickse, Mishra, and Fisser, 2016; Gerold, 2018; Jones, 2010; Klawe, 2018).

The Controversy over Teaching and Learning

Making creativity central to our educational practice has proven to be difficult. Issues relevant to integrating creativity--such as, the definition of creativity, its measurement, conditions that enhance creativity, and the personality traits that are conducive to creativity--still remain controversial subjects. The integration of creativity in education depends on their resolution.

Perhaps the most serious issue that is relevant to the integration of creativity is the controversy that has been raging for years between two major approaches in educational practice. An act of creation has two distinct features: it engages self-activity, or agency, on one hand, and it also involves transcendence, that is, an encounter with something that has not existed prior to the act of creation. The dividing line in this controversy related to creation and creativity is between teaching, or transmission of knowledge from the teacher to the student, and

learning, as the activity that originates with the student. Learning involves the exercise of agency by students; but teaching provides a possibility of transcendence, that is, encountering something totally new to students, that students did not know before they were exposed to it. In the current conception, the two do not seem to mesh easily: in teaching, knowledge appears to come from outside the student's mind, and in learning, the student is the source of meaning-making and knowledge.

The main objective of the learning approach is to engage students in meaning-making and knowledge production. This approach has several varieties, such as reflective learning, situated learning, distributed learning, problem-oriented learning and some others. The learning approach is decidedly student-centered. In her succinct definition of learning, Holly Inglis writes: "Learning is about actively creating meaning and order out of our experiences as learners see, do, and connect." The role of the teacher is not to be the source and the principal transmitter from whom students receive knowledge. Knowledge in this case does not come from outside the student. As Inglis describes, "The true learning occurs not because of the external information, or stimuli, but because of the inner cognitive work that is provoked by the developmental need of the learner to integrate information and make meaning and order out of their world (Inglis, 2014, p. 1)."

Over the last few decades the learning approach has gained much prominence in education. It has dominated educational research, policy, and practice. Gert Biesta, one of the major critics of this approach, underscores its dramatic expansion by describing the widespread application of this conceptual approach as "learnification" of education (Biesta, 2014; Biesta, 2013). Learning has become a central concept for our social practice. In the age of knowledge economy, learning and even lifelong learning has emerged as a panacea for resolving many contemporary problems and a key to the future progress of our civilization. One can certainly sense the tone of urgency in the following advocacy of the need for learning:

> There is a need to learn new ways of thinking to match the new kinds of problems that we face. The central challenge of our time then is to transform the way people think of themselves and what they are capable of. It is only by changing the sense students have of themselves as learners that they can begin to develop their capacities and realise their potential (Ranson, et al., 1996, p. 11).

Discussions of learning are no longer confined to the educational sphere and its institutions. Learning has entered the discourse at world public forums and in international organizations. The UNESCO report from the 2010 Shanghai International Forum on Lifelong Learning includes the following impassioned appeal:

> We are now living in a fast-changing and complex social, economic and political world to which we need to adapt by increasingly rapidly acquiring new knowledge, skills and attitudes in a wide range of contexts. An individual will not be able to meet life challenges unless he or she becomes a lifelong learner, and a society will not be sustainable unless it becomes a learning society (Yang and Valdés-Cotera, 2001).

The dramatic expansion of the learning approach has not been unproblematic and has met with some poignant criticism and opposition. Gert Biesta has been perhaps one of the most vocal and astute critics of the "learnification" of education. His main criticism is that learning limits existential possibilities that education has to offer; it denies students an opportunity to confront something that is radically new and that transcends their experience. In other words, Biesta's argument is that education should offer existential situations in which students encounter transcendence. He points out that education

> . . . is perhaps not just about growing and deepening what is already there [in students' mind], but that education can also be understood as an encounter with something that is radically new, something that students precisely do not already have. Moreover, it is possible to think of education then as an encounter with something that comes to you without reason, so to speak, because if it is something that is really new, that really comes from the outside, students may not yet have any "anchor points" for connecting with what is coming to them, and may therefore not (yet) be able to see the "reason" of what is coming to them (Biesta, 2014, p. 240).

Biesta is not a traditionalists calling for return to authoritarian forms of teaching. He devotes special attention to drawing the line between himself and traditionalists. His main argument, as he explains, is "not to suggest that students should have no voice in what goes on—as this would turn education (back) into authoritarian modes of operation—but it is crucial to see that the voice of the student and the voice of the teacher are very different voices that come with different responsibilities and expectations" (Biesta, 2015, p. 83). His ambition is to develop an argument for teaching and the teacher that is explicitly progressive, in order to counter conservative calls for a return of the teacher as a figure of authority and control (Biesta, 2012a, p. 36). He recognizes that learning holds an important emancipatory potential but the concept needs to be re-politicized in order to realize this potential (Biesta, 2012a; Biesta, 2014). He also does not intend to eliminate learning as a conceptual approach in educational practice. Rather, he feels that education should offer a variety of existential possibilities that both teaching and learning offer (Biesta, 2014). He is also not oblivious to the tension that exists between learning and teaching. In his proposed resolution of this tension he suggests that teachers should perform their role with a sense of irony and students should treat the knowledge they receive from the teacher as subjective truth to which they willingly grant the status of authority (Biesta, 2013b, p. 459).

Coming from someone with a strong progressive bias, Biesta's criticism of the learning approach produces a very strong impression. Fundamental changes in the way we view reality and radically new approaches have certainly been part of human experience. Moreover, unorthodox ideas and new knowledge that transcend prior experience have produced the most rapid acceleration in the evolution of our civilization and have opened many new unexpected possibilities. Indeed, denying this experience to students will be a significant omission in their education.

However, the solution that Biesta proposes is not convincing. Even assuming that he is right in his assessment, and the balance in our educational system has shifted toward learning and away from teaching that allows students to experience transcendence, his solution adds little to our educational practice. Although Biesta advocates balance between teaching and learning, he still thinks of these two conceptual approaches as quite separate from each other—the way they are currently used. Such balance would make sense only if it would lead to a synthesis. But Biesta does not envision any synthesis. One wonders about the benefits of educational practice in which students will have the experience of making meaning without transcendence and encounter radically new knowledge apart from making meaning. Without synthesis, the balance between the two approaches is not likely to make much difference. If, indeed, a synthesis is on Biesta's mind, then obviously the experience of such synthesis should be part of education. Otherwise, students will be left without much guidance as to how they can effect this synthesis.

The debates over teaching and learning indicate that there remains an unresolved tension in the two approaches--between confronting the unknown and exercising one's autonomy and agency as part of the emancipation practice.

The fact that skilled educators can use both approaches does not eliminate the problem and does not resolve the tension. There is an unmistakable paradox lurking at the heart of the teaching-learning conundrum in the current educational practice. This paradox goes to the very heart of making the process of creation central to our educational practice. In order to resolve this paradox, our educational practice should bring together transcendence, or encounter with the unknown, and students' exercise of their agency as aspects of the same process, and not as two separate and only tangentially related activities.

Can Teaching and Learning Be Integrated?

Learning is a form of equilibration. When students engage in learning, they apply what they know to what they do not know. In other words, they include what they do not know into their mental operations, or constructs. As a result, students assimilate what is unknown to what is known; hence no encounter with the unknown actually takes place.

Learning obviously satisfies one important condition that is required for a creative act. It engages the agency of the student. However, it does not satisfy another important condition—the encounter with a new mental construct, or operation, that is totally unfamiliar to students. Radical novelty represents a disruption of balance, or disequilibrium. Therefore, one can reformulate the problem of integrating teaching and learning into the problem of integrating equilibration and the production of disequilibrium. So, can these two operations that are so different be integrated?

Humans can learn and learning is a form of equilibration. Therefore, human mind is capable of performing equilibration. But humans are also capable of creating new mental constructs that generate new ideas. Consequently, the human mind can do both: perform equilibration and produce disequilibrium. The fact that both equilibration and the production of disequilibrium occur in human mind suggests that they should be in some way related to each other.

In his famous proof of consistency and completeness, Kurt Gödel proves that any axiomatic system is bound to contain statements that are true but at the same time their truth is indemonstrable within this system. In other words, they represent a radical novelty. The demonstration of their truth requires changing the system's original axioms. However, Gödel also proves that changing original axioms does not help in resolving the problem of consistency and completeness since the new modified axiomatic system will also contain true statements that would be indemonstrable; and thus ad infinitum: no matter how many times we change axioms and modify our axiomatic system, we can never escape the problem of the presence of true statements that cannot be justified (Nagel and Newman, 2001). Thus Gödel's proof shows that equilibration that we use in constructing axiomatic systems also produces disequilibrium, therefore, our mental operations combine equilibration and disequilibrium as aspects of the same process.

The pioneering work of Swiss psychologist and philosopher Jean Piaget on the origin of human intellect also demonstrates the close interrelationship between equilibration and the production of disequilibrium. Piaget's seminal work *The Origins of Intelligence in Children* discusses, for example, how the equilibration of sensory-motor operations (hearing, seeing, etc.) gives rise to mental images, thus opening a possibility for symbolic operations. The equilibration of incommensurable operations leads to the emergence of a new and more powerful level of organization that conserves them and their differences as its particular cases. The adaptation of the sensory-motor operations to this new level of organization enriches them and creates their symbolic equivalents

(for example, visual and sound images) (Piaget, 1998). Piaget has shown that equilibration creates a radical novelty with new properties that have not been observed prior to its emergence. In other words, Piaget demonstrates that equilibration and the production of disequilibrium are closely interrelated aspects of the same process—the process that brings about radical novelty; and this process combines both equilibrations and the production of disequilibrium.

Our capacity to produce new and more powerful levels and forms of organization is an integral part of reality from which this capacity has emerged in the course of the evolution. Humans have inherited this capacity in the course of the evolution and transformed it into a powerful tool for their advancement. As a product of the evolution, our capacity to produce new and more powerful levels and forms of organization is but a particular case of the more general process of creation of new forms that we observe at all levels of reality. Therefore, our mind and reality must share the dynamic features that make the emergence of new levels and forms of organization possible--the dynamic equilibrium, or the balance between equilibration and the production of disequilibrium.

Just like we find the dynamic interplay between equilibrium and disequilibrium in the way our mind operates, we can observe the same interplay in the processes that take place at many other levels of organization of reality: from the sub-atomic level all the way to the cosmic scale and civilization. Many, including myself, have argued that reality does not have any preference for either equilibrium or disequilibrium (Prigogine and Stengers, 1984; Wolfram, 2002; Vicsek, 2002; Carr, 2003; Shkliarevsky, 2011). Reality is constantly in the process of evolution. It is a dynamic system; and as all dynamic systems it is never either in a state of equilibrium or in a state of disequilibrium; rather, it maintains equilibrium between equilibrium and disequilibrium (Shkliarevsky, 2007, pp. 330-31). In fact, dynamic systems are always in a state best characterized as "the edge of chaos"—a phrase coined by mathematician Doyne Farmer and popularized by Stuart Kauffman (Wikipedia article The Edge of Chaos). The astrophysicist Manasse Mbonye, for example, sees the interplay of equilibrium and disequilibrium in the processes of space expansion and the creation of matter in our universe. In his view, "the universe is always in search of a dynamical equilibrium (Mboney, 2003, pp. 1-2)."

Toward a New Educational Practice

The preceding discussion makes clear that there are no principal obstacles to integrating equilibration, or learning, and the production of disequilibrium, or teaching, in our educational practice. In fact, systems in nature conserve themselves by creating new levels and forms of organization; and this process operates on the basis of balance between equilibrium and disequilibrium (Shkliarevsky, 2015, pp. 637-38). The teacher and students also constitute a system. Like any other system, this system also has to conserve itself and in order to do so, it must create new levels of organization (in this case, mental organization), which is what education is—the progressive creation of new and more powerful level of mental organization. Both teaching and learning are used in today's educational practice. However, they are used as two largely independent and separate modes. But there is no reason why the teacher-student system should not be able to combine equilibration (learning) and the production of disequilibrium (teaching) in creating new levels of mental organization. In order to make the process of creation central to educational practice, learning and teaching should become aspects of the same process.

Teaching and Learning in the Current Educational Practice

As has been indicated, in the current educational practice teaching and learning are two independent modes; that is to say, production of meaning by students does not occur at the same time as transmission of knowledge. When the teacher presents new material in class, students are largely passive recipients. They may venture a question

or two, but there is simply no opportunity for any serious meaning making. Students have to follow closely the teacher's explanations. They have to focus on understanding what the teacher says and that requires all their attention. They simply cannot possibly engage in any adaptation of their mental constructs to the new material, which is what meaning making is. Their agency remains disengaged.

As students follow the teacher's explanations, they have no chance to examine them; they generally have to take what the teacher says for granted, accept it as truth. In this case, the new material conflicts with what students already know, since it is radically new. This conflict hinders the appropriation of the new material and at the same time erodes the old knowledge, creating confusion in students' minds. Students do not understand the connection between what they know and the new knowledge to which they are exposed. Since the material is totally new, and not just a variation on old themes, the mental constructs available to students and those required for appropriating the new material are incommensurable. As a result, in order to accept new knowledge, students have to abandon what they know. The discontinuity they experience is baffling, if not indeed traumatic. It creates confusion; it hinders appropriation of the new knowledge and conservation of the old knowledge.

The conflict between the old and the new knowledge persists even when students work on appropriating the new material at home on their own. Their adaptation to the new knowledge faces several problems. When students perform this adaptation, or learning, the mental constructs they use will inevitably affect and change the material they are trying to appropriate since this material requires totally new and more powerful mental constructs. As a result, the adaptation will inevitably distort the new knowledge and students will be in no position to make correctives on their own. Students will have to rely largely on their intuition, which will give them little conscious control over the process. As a result, the appropriation is not likely to be adequate.

When students go back to the classroom and present the results of their appropriation, many of them face a possibility of being embarrassed, which makes them reluctant to contribute to class discussion. Rather than step forward and try to articulate their views, they are more likely to hold back and let other students do the talking. This attitude stifles class discussion.

When students receive new and unfamiliar material from the teacher, they will necessarily have to suspend the knowledge they have and treat the new material as a revelation—the final truth of an unknown provenance. The appropriation of this truth will require that student should simply replace the old knowledge with the new. They have no conscious and critical control over this process that does not engage their agency. Such appropriation will not conserve old mental constructs and will not empower students. Since the initial reception of the material practically does not engage students' agency, students for the most part remain detached, which makes the appropriation of the new material even more difficult.

Thus, the current educational practice does not fully engage students' agency. It also does not conserve knowledge. Students move from one level of mental organization to another without any continuity or understanding of how knowledge is created. This practice makes the process of appropriation of new knowledge stressful. Since it does not affirm their agency, students simply cannot enjoy the process that largely disempowers them.

The New Educational Practice: Integrating Teaching and Learning

As has already been indicated, the teacher and students constitute a system. The teacher occupies the global, regulatory level in this system and students are located at the local level. Like all other systems, the teacher-students system must conserve itself.

Creating new and more powerful levels of organization involves constant adaptation of the level of local interactions to the global level. Such adaptation enriches local interactions and makes them more powerful. Their re-equilibration generates a new and more powerful global level and the entire process enters a new cycle in its evolution (Shkliarevsky, 2017, pp. 30-34). Therefore, students who operate on the level of local interactions must also constantly adapt to the global level at which the teacher operates.

The global level is more powerful--in the combinatorial sense—than the level of local interactions; it offers many more possibilities than the local level. That is the reason why students have difficulty assimilating the new material presented by the teacher. Due to power differential between the two levels, students simply lack the wherewithal that would allow them to access the global level.

Since the teacher is located at the more powerful global level, he or she can observe and has full access to the level of local interactions. The teacher is aware of what students know and the mental constructs that make their knowledge possible. For this reason, the teacher can play a crucial role in providing students with access to the global level.

Knowledge systems rest on foundational propositions, or what we often call self-evident truths. The fact that we may be unaware of these truths makes no difference. They still do what they are supposed to do: shape our perceptions and define our view of reality. The knowledge that students have is no exception. Whether they are aware of it or not, their knowledge is also based on foundational assumptions, or self-evident truths.

The teacher should make them aware of this fact. The teacher and students should together engage in the identifying and critically examine the self-evident truths that provide the foundation for students' knowledge. In addition, the teacher may ask students to justify these assumptions, just to make them realize the contingent nature of such assumptions. This entire critical exercise presents no problem for students since they operate on the level that is familiar to them. The process is certainly a form of learning as it engages students' agency.

The next move is strategically very important. The teacher should expose students to radical novelty. As has been explained earlier, the exposure to radical novelty can be disturbing and confusing, if not indeed traumatic. The teacher's goal at this stage is to diminish confusion, make students as comfortable as possible, and most importantly, continue to engage their agency. The teacher must make sure that the encounter with the new level of organization takes place on the territory familiar to students. In order to achieve this goal, the teacher must operate within the frame that is powerful enough to include both the knowledge students have and the new knowledge as its particular cases—that is, cases that are true under specific circumstances or assumptions. The understanding of the process that creates knowledge provides such frame.

The way to present radical novelty is to express it in terms of the level of local interactions. The teacher should present it in the form of facts that disagree with the fundamental assumptions on which students base their current knowledge. These facts are products of a new and more powerful level of mental organization. When students

encounter such facts, they cannot fail to realize their incompatibility with the self-evident truths they hold. This realization is the bridge to the next strategic move: the teacher engages students in discussing the way in which the assumptions they hold should be modified to accommodate the new facts. Although this problem is undoubtedly a difficult one, there is nothing in it that students in principle are not capable of doing, especially since the teacher will guide them in their search for a solution. When the modification is completed, the teacher and students can discuss and compare the two levels of organization—the new and the old one. As one can see, this stage involves both the teacher and students. Students do not have to abandon their mental constructs. They modify them. The process of learning continues and yet the students are exposed to radical novelty. Thus the entire process combines both learning and teaching.

Students' in-class exposure to the new and more powerful level of mental organization will certainly facilitate their further appropriation of the new material at home. When they get back to class, the cooperative atmosphere established in the first class session will encourage interactions among them and between them and the teacher. Since the terrain is familiar, students will feel perfectly comfortable asking questions and making comments as the adaptation and learning continues.

This new educational practice has a number of advantages over the current one:

1. It integrates and balances teaching and learning—or equilibration and the production of disequilibrium—in one process. Students' agency is fully engaged throughout this process. The teacher presents new mental constructs to students as facts, i.e., in terms that are familiar to students, which facilitates the process of adaptation. Learning starts in the classroom where students compare and contrast their own mental constructs with the new and more powerful ones. Although the teacher guides students in this process, they fully participate in modifying their assumptions to accommodate new facts.
2. The fact that this process starts in the classroom helps students to continue this process at home on their own. They continue to adapt and work out the implications of this adaptation.
3. Students' encounter with new mental constructs occurs in the manner that engages their existing mental constructs. Therefore, the exposure to radical novelty is combined with the continued process of learning. As a result, the new level of organization does not appear to students as if by a miracle that emerges out of nowhere. Students participate in modifying their mental constructs to accommodate new facts. They fully understand where new mental constructs come from and how they are connected to their old knowledge. The experience of the connection between equilibration (learning) and the production of disequilibrium (teaching) helps to avoid the confusion and destabilization that the exposure to disequilibrium may otherwise cause.
4. The new practice fully integrates the old and the new knowledge. The old knowledge is not discarded but is conserved as a particular case of the new, more inclusive, and consequently more powerful frame.
5. The new practice familiarizes students with the notion that knowledge is constructed. They see the production of knowledge as a continuous process of creating new and more powerful levels of mental organization.
6. The entire process of knowledge creation is open and accessible to students. Through their constant exposure to this process students begin to understand it better and acquire habits and skills required for knowledge creation. As a result of this experience, students will most likely act differently in the future when encountering new and unfamiliar views. Rather than trying to prove their own point of view, they will to attempt to create a new and more powerful frame that would integrate all points of view, including their own, as its particular cases. Their attention will be focused more on the process of creation than on its products.

7. Since the new practice continually engages students and their agency, it helps them come to grips with their natural capacity to create. They enjoy this process as one that affirms their self and their life. The empowerment they experience makes the entire process of education enjoyable and efficient.
8. By exposing students to the process of creation, the new educational practice cultivates their mind. But it also prepares them to meet the needs of modern society. Thus this practice helps fulfill the dual task of education, i.e., serving the needs of the individual or those of society, that has been much debated in the history of American education. The debate between John Dewey and David Snedden, the education commissioner of Massachusetts, is perhaps the best illustration of this controversy that is still the subject of debates today (see Zehr, 1999; Abowitz, 2008; Adams and Adams, 2011; Kett, 2017).
9. The new educational practice has important political implications. It involves both the teacher and the students as equal partners in a common enterprise; it invites and encourages the participation of all involved. Such open and inclusive nature of the new educational practice has important implications for the implementation of modern democratic principles of universal inclusion and empowerment.
10. The process of creation that is integral to the new practice requires the recognition of autonomy and agency of all participants. Such recognition is the basis of true morality. Thus the new practice will foster moral education of young people.
11. Since our capacity to create is an important source of our humanity, individuals who continue to create throughout their life cycle satisfy their important existential need, which helps them live a more productive and happier life.
12. Thus, as one can see, the new educational practice serves a variety of purposes that many modern educators see as essential for our educational system.

Conclusion

Transforming our educational practice is not going to be an easy task as it will require changes in people and institutions. It will also affect other aspects of our social practice in general, as our system of education is a part of the much larger aggregation of practices that are intimately related to each other. Such transformation will take much, much more than one article or even a book. It will require efforts and contributions by many people—education professionals, students, but also politicians, media people, public figures, religious leaders, and many others. This article is just one very small step in this direction.

As has been indicated earlier, there are many pragmatic reasons for making creativity central to our educational practice. Economic and technological innovations, social changes, global transformations, and many other factors have enormously increased the importance of creativity and knowledge production in our society.

Creativity has always played an important role in the evolution of our civilization. However, the demand for creativity today is much stronger than at any other time in human history. Creativity and innovation have become perhaps the most important factors in our economy and production, our social and political relations, indeed in our whole way of life. We expect creative solutions and approaches from people in everyday situations and in common lines of employment, not just in select elite occupations. In order to satisfy this enormous demand in creativity, we need to change our education.

As this article has argued, there are no principal obstacles to making creativity central to our education. One important problem that must be solved is the problem of integration of teaching and learning that are currently used as two separate and distinct modes of education. This article has demonstrated that equilibration, or the

operation required for learning, and the production of disequilibrium that is involved in teaching are both essential aspects of the process of creation. As such, they complement, rather than oppose, each other. Moreover, the article has outlined the new educational practice that combines teaching and learning as part of the same educational process.

The outline of the new practice is very general. There is no doubt that this model requires further development, elaboration, and enrichment by both theoreticians and practitioners in the field of education and other cognate fields. Moreover, the development of the new educational practice will also require the cooperation and input from students who will bring their talent, ingenuity, and the passion for experimentation and innovation to this enterprise.

There is no doubt that the implementation of the new practice is a colossal undertaking that will require a great deal of energy and resources. But the payoff is definitely worth it. The result of this change will be generations of well-educated young people who will not only appropriate the intellectual heritage of the generations that have preceded them, but will also understand, master, and control the process that creates new levels and forms of mental organization. This knowledge and experience will allow them to be creative when they want to, not only when they can.

The ability to control one's own creativity capacity will be very important for cultivating young minds. However, it will also make them an invaluable asset for society, as the realization of their creative potential will result in new ideas, new products, new approaches and initiatives, and new and hitherto unknown ways and forms of life.

But all these benefits are not the only reason to making human capacity to create central to our educational practice. The process of creation is the most essential part of reality and is the source of its continued evolution. Enhancing our creative capacity and learning how to control it will help us use the creative potential of all humans to the fullest extent possible. Creative acts realize our potential. Creative acts empower those who perform them. In this sense, creative act is a liberating act that emancipates us and frees our essential nature. Thus the educational practice that centers on the process of creation will not only make our education more effective and efficient, but it will also contribute to one very important goal that our civilization has pursued for ages—the emancipation of humanity.

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EFFECTIVENESS OF ASSESSMENT INSTRUMENTS HIGHER ORDER THINKING SKILLS TO GROW SELF REGULATED LEARNING STUDENTS JUNIOR HIGH SCHOOL

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ABSTRACT
Self-regulated learning (SRL) is indispensable for students to help transform mental skills into academic skills and strategies. Students who study with SRL can more easily build on successful academic achievement. This study aims to determine the effectiveness of the application of higher-order thinking skills (HOTS) assessment instruments in growing SRL of students Junior High School, especially on the basic competence of the human circulatory system. The design of the study was quasi-experimental. Research subjects include two groups students of grade eight at Junior High School in Bandar Lampung at Lampung Province, Indonesia with random sampling technique. The subjects of the study were experimental class 1 and experiment class 2. The research data was collected using an SRL scale instrument. Data analysis technique through statistical test parametric independent sample t-test. The result of data analysis shows the application of HOTS assessment instrument to effectively grow SRL of students Junior High School especially on the basic competence of human circulation system.
Key Words: higher order thinking skills, self-regulated learning, assessment for learning, feedback.

INTRODUCTION

Science develops scientific understanding through various research activities so that students are able to analyze, evaluate, and build scientific knowledge independently (Duschl, et al., 2007). Science not only covers the content but also involves a number of scientific skills and attitudes gained through the learning process of science. For students learning science can be implicated in physical and mental activity and includes hands-on and minds-on activities (NRC, 2003). However, the quality of science learning in some countries of the world at this time is still experiencing various obstacles (Tjalla, 2010).

The low quality of science learning in some countries of the world is reflected through the results of the analysis of students' achievement in several international studies such as TIMSS (Trends in International Mathematics and Science Study) and PISA (Program for International Students Assessment). Based on data analysis of TIMSS mapping 2015, there are 15 out of 47 participating countries are in a position below the average international score that is below the score of 500 (IEA, 2016). Furthermore, the results of the 2015 PISA analysis mapping study still contain 49 of the 72 participating countries also have an average science achievement score below the international average score that is below the 501 score (OECD, 2016).

Achievement of science achievement is classified as low, among others, caused by the development of self-regulated learning (SRL) students who have not maximized. Fundamentally SRL is an individual form of learning that relies heavily on student learning motivation (Pintrich & De Groot, 1990). Motivation is an internal factor affecting student SRL (Cobb, 2003). Motivation to learn can bring students feel more competence, confidence, and independence (Zimmerman, 2002). Motivation guides students into self-regulated learners who are able to build learning goals, regulate and control cognition, and evaluate objectives (Valle, et al., 2008). One of the causes of the low ability of student SRL is that teachers' habits present more-oriented learning assessments measuring lower order thinking skills (LOTS) rather than developing higher order thinking skills (HOTS).

The Cognitive domain of remembering (C1), understanding (C2), and applying (C3) in Taxonomy Bloom revised is used to measure LOT skills whereas HOT skills development fundamentals use cognitive sphere analyzes (C4), evaluate (C5), and create (C6) (Narayanan & Adithan, 2015). Students who are often trained in HOTS level also have the ability to solve the LOTS level problem (Jensen, et al., 2014). Students who are often tested using HOTS

have a habit of thinking HOTS as well (Saido, et al., 2015). Thinking HOTS invites students to be able to apply their knowledge and skills in a new context (Brookhart, 2010).

HOTS thinking includes complex thinking that goes beyond basic fact-finding skills so as to enable students to store information and apply solutions to real-world problem solving (Ramos, et al., 2013). HOTS thinking invites students to apply new information or prior knowledge and "manipulate" information to reach possible answers in new situations (Heong, et al., 2011). HOTS thinking encourages students to think deeply about the subject matter and is able to stimulate the development of higher-order thinking skills (Barnett & Francis, 2012). The development of HOTS thinking facilitates the transition process of knowledge and enhances the responsibilities and functions of students in society in the future (Zoller, 2001). In an effort to determine the level of ability to think, help improve and improve students' thinking skills should be assessed ongoing learning assessment by applying assessment for learning (Indrastoeti, 2012).

Assessment for learning is an interactive assessment between teachers and students undertaken during the learning process to obtain information on the strengths and weaknesses of learning and then use the information to improve, modify or modify learning to be more effective, and improve students' learning competencies (Brookhart, 2014). However, to improve the effectiveness of the assessment for learning implementation, teachers must use various assessment strategies (Pachler, et al., 2011).

One of the strategies that teachers can develop when conducting the assessment for learning is through the provision of feedback (Assessment Reform Group, 2002). In the learning of giving feedback can increase academic engagement between teacher and student (Carless, 2011). Feedback can help teachers and students to know the success rate of completed tasks and build development goals at a later stage (Brown, 2004). Even the student's SRL capability is highly dependent on the frequency of feedback in learning (Cakir, et al., 2016).

The main focus of the HOTS assessment instrument in this study is to act as an assessment for learning the instrument with feedback. This study aims to determine the effectiveness of the application of HOTS assessment instruments in grow SRL of students junior high school students, especially on the basic competence of the human circulatory system.

THEORITICAL BACKGROUND

Assessment of Higher Order Thinking Skills

Based on the revised bloom taxonomy, thinking skills in the cognitive domain are divided into six levels: memory, understanding, application, analysis, evaluation, and creation (Anderson & Krathwohl, 2001). According to Narayanan & Adithan (2015) that the cognitive aspects of memory, understanding, and application are classified into lower order thinking skills (LOTS) while the cognitive domain of analysis, evaluation, and creation includes higher order thinking skills (HOTS).

Anderson & Krathwohl (2001) describe the cognitive domain of high-order thinking skills (1) to analyze the material or concept into parts, to determine the relationships between parts or part relations to the structure or objectives as a whole, (2) to evaluate make judgments based on criteria and standards through examination and criticism, and (3) creating that includes elements to form a coherent or functional entity or reorganizing elements into new patterns or structures through the process of generating, planning or producing.

Furthermore, Brookhart (2010) asserts that higher order thinking skills include the ability of students to apply the knowledge and skills that have been developed during the learning of the concept application that has not been previously thought and the ability to apply and connect learning with new things that have never been taught.

Problem HOTS can be designed using operational verbs that fit the cognitive domain. For example, to test the cognitive domain of student analysis, teachers can make problems using operational verbs that include the cognitive domain of analysis, such as analyzing, detecting, measuring, or reviewing (BSNP, 2006). Referring to the revised bloom taxonomy, operational verbs of the HOTS cognitive domain are shown in Table 1.

Table 1 Operational Speeches of Cognitive Spheres HOTS Revised Bloom's Taxonomy

Analyze (C4)	Evaluating (C5)	Creating (C6)
Train	Prove	Blending
Blending	Choose	Build
Maximizing	Separate	Limiting
Divide	Monitor	Shaping
Distinguish	Clarify	Make
Creating structure	Maintain	Make a draft
Solve	Predict	Facilitate
Govern	Projecting	Clarify
Focus	Decide	Produce
Choose	Validating	Bring up
Organize	Interpret	Showing
Brighten	Support	Tackling
Detecting	Directing	Create
Diagnose	Check	Dictate
Diagramming	Test	Find
Affirmed	Coordinate	Abstracting
Reviewing	Criticize	Animate
Define traits	Criticize	Compose
Associating	Test	Set
Analyze	Measure	Combine
Attribute	Rate	Generalize
Auditing	Weigh	Produce work
Editing	Assign	Connect
Correlate	Detailing	Remind
Organize	Justify	Categorize
Test	Blame	Encoding
Describe		Combine
Explore		Creating

(Source: BSNP, 2006)

According to Haladyna, et al. (2002); Devi & Widjajanto (2011) there are several ways that can be used as a guide in writing about HOTS, the questioned material is measured using behavior in the cognitive domain of HOTS level of analysis, evaluation, and create then each question is given stimulus in the form of source/reading material such as text, paragraphs, cases, images, graphics, photographs, formulas, tables, lists of words/symbols, samples, movies or sound recordings. Furthermore, according to Resnick (1987) that HOTS has non-algorithmic characteristics, is complex, implements many solutions, involves variations of decision making and interpretation, applies many criteria, and requires a lot of effort.

Assessment For Learning

Assessment is an integral part of the overall learning process (Brown, 2004). National Research Council (1996) describes the assessment of learning should lead to (1) knowledge, understanding of matter and application, (2) critical thinking habits, creative thinking, and self-regulation, and (3) high-order thinking skills. Assessment for learning is the process of seeking and interpreting evidence for students and teachers to use in determining student positions after learning, what to do next by teachers and students, and how to achieve goals (Stiggins & Chappuis, 2006).

Assessment for learning activities are not focused on the results of the assessment, but rather address the students' understanding of something, knowledge, and applications doing something and understanding how learning and achieving learning objectives (Assessment Reform Group, 2002). Assessment for learning is an interactive assessment between teachers and students undertaken during the learning process to obtain information on the strengths and weaknesses of learning and use the information to improve, modify or modify learning to be more effective, and improve student learning competence (Shepard, 2005).

Feedback

If the assessment is an integral part of learning, feedback serves as the "heart" of learning (Brown, 2004). Feedback is a key element in assessment for learning (Sadler, 1989). Students need feedback when they have done something right, feedback helps students to know the level of success of the completed task and build the development of

the next goal (Brown, 2004). Giving feedback as part of the assessment for learning helps students realize the difference in the gap between goal achievement and student knowledge, understanding, and skills. Giving feedback leads the students to act toward the goal (Rushton, 2005).

Self-regulated learning (SRL)

In addition to the feedback mechanism, the success of the assessment for learning is also determined by the students' ability to regulate the behavior and learning environment. Understanding the concept of SRL has an important role for the development of learning ability and self-initiative actions that include goal setting and regulatory efforts to achieve goals, time management, and regulation of physical and social learning environments (Zimmerman & Risemberg, 1997). SRL refers to careful planning and monitoring of the cognitive and affective processes covered in the completion of academic tasks. SRL is the ability to control behavior independently through self-observation, decision, and self-response (Bandura, 1977).

To provide evidence that the SRL is really happening there needs to be an instrument developed to assess the process of SRL (Higgins, 2000). One of the instruments that can be used in assessing SRL is the components of self-regulated learning (SRLIS), the instrument developed by Zimmerman & Martinez Pons (Cobb, 2003). SRLIS is one of the most widely used interview procedures to measure SRL (Zimmerman & Pons, 1988). The main objective of SRLIS is to measure the strategy of SRL, while the secondary objective of the SRLIS is to determine whether there is a correlation between the use of the SRL strategy with the trace of student achievement. Zimmerman & Martinez Pons describe 15 indicators of SRL strategies incorporated in SRLIS as labeled in Table 2.

Table 2 SRL Strategic Indicators in SRLIS

Strategic Indicators	**Description**
Self-evaluation (1)	The statement indicates the evaluation that the student submits to the quality or progress of the work
Organizing (2) and transforming information (3)	Re-arrangement clearly or vaguely on learning materials
Preparation (4) and goal planning (5)	Preparation of objectives and sub-goals and planning steps, time, and completion of activities related to the objectives
Search information (6)	Enterprises get information from non-social sources
Custody records (7) and monitoring (8)	Attempts to record/record events or results
Environment formation (9)	Choosing or arranging a physical state to make learning easier
Self consequences (10)	A reward or punishment plan for success or failure
Training (11) and memorization (12) (rehearsing and memorizing)	The attempt to memorize the material with a clear or vague practice
Search for social assistance (13)	Ask for help from peers, teachers, and adults
Review (14)	Re-read tests, notes or textbooks for preparation for future classes or tests
Other (15)	Learning behaviors posed by others such as teachers or parents and all verbal answers are not clear

(Source: Cobb, 2003)

METHODS

The design of this research is a quasi-experimental type nonequivalent control group. The research was conducted in February 2017 at Junior High School in Bandar Lampung at Lampung Province, Indonesia, involving two groups students of grade eight with random sampling technique. One group of students acts as experimental class 1 and one other group as experiment class 2. The two experimental classes in this study apply 20 items of HOTS as assessment for learning applied to the student worksheet and 20 items about HOTS as the assessment of learning. In addition, in order to help improve the quality of learning process optimally, then in this study also provides diktat teaching materials for students. Implementation of the learning process implemented by applying the model discovery learning.

The HOTS assessment instrument used in the research is the result of independent development by researchers with research design model of education research and development (R & D) which refers to Gall, et al., (2003). The HOTS assessment instrument has gone through a series of theoretical validity and empirical validity

processes. Theoretical validity involves 2 validator experts on a material, construction, and language aspects. Empirical validity through a trial involving 174 students of grade nine at Junior High School in Bandar Lampung at Lampung Province, Indonesia. Based on the result of quantitative and qualitative data analysis revealed that HOTS assessment instrument of development result has been declared eligible to be used as the assessment for learning.

The research data was collected using an SRL scale instrument adapted from Zimmerman (2002). This SRL scale instrument contains 14 likert scale SRL questions. Instrument scale SRL is given to students when at the beginning of learning as a pretest and end of learning as a posttest with a frequency of 5 times face-to-face meetings. The way students use the scale of the SRL instrument is to provide a checklist (√) on the choice of answers then the researchers do the conversion of student choice answers (Table 3).

Table 3 Conversion of Student Answers in Instrument Scale SRL

Answer Options	**Value Conversions**	
	Item Favorable	**Item Unfavorable**
Never	1	5
Rarely	2	4
Sometimes	3	3
Often	4	2
Always	5	1

The data analysis technique begins by calculating the percentage of the ability of the experimental class 1 and experimental 1 experimental students and then determining the students' ability of the students' ability by comparing the percentage of students' ability score and the tendency interval of SRL (Arikunto, 2011). The interval of the tendency of SRL (Table 4).

Table 4 Criteria for Student's SRL Ability

Interval Trend	**Criteria Student SRL**
81,00 – 100,00	Very High
61,00 – 80,00	High
41,00 – 60,00	Medium
21,00 – 40,00	Low
00,00 – 20,00	Very Low

(Source: Arikunto, 2011)

Continue to calculate the score of N-gain of the students' ability to experiment 1 and experiment 2 using the Hake N-gain formula and then interpret the N-gain score with N-gain Hake (Hake, 2002). As shown in Table 5.

Table 5 N-Gain Hake Score Criteria

N-Gain	**Criteria**
N-gain > 0,70	High
0,30 ≤ N-gain ≤ 0,70	Medium
N-gain ≤ 0,30	Low

(Source: Hake, 2002)

Furthermore, the analysis on the effectiveness of the HOTS assessment instrument was conducted by the inferential statistical test of independent parametric sample t-test (t-test). Then as supporting data of research result, hence the qualitative aspect of student response in learning also measured that is by using questionnaire which applied by the technique of focus group interview.

RESULTS

Recapitulation result of data analysis of pretest and posttest ability of student's SRL on experiment class 1 and experiment 2 (Table 6).

Table 6 Recapitulation of Pretest and Posttest Analysis of Student SRL

Experiment Class	Pretest SRL (%)	Criteria Pretest SRL	Posttest SRL (%)	Criteria Posttest SRL
1	39,52	Low	92,00	Very High
2	38,67	Low	90,76	Very High
Average (%)	**39,09**	**Low**	**91,38**	**Very High**

Based on Table 6 it can be seen that students in experimental class 1 and experimental 2 at the beginning of the lesson (pretest) have the ability of "low" category of SRL while at the end of learning (posttest) that is after the teacher apply HOTS assessment instrument showed improvement of the ability of SRL with criteria "very high "(Arikunto, 2011).

Facts related to the improvement of students' learning ability after the application of HOTS assessment instruments in the learning were supported also by the recapitulation of N-gain analysis and t-test (Table 7).

Table 7 Recapitulation of N-gain Analysis and t-Test of Student SRL Ability

Class Experiment	Average			t-Test
	Pretest (x ± sd)	Posttest (x ± sd)	N-gain	
1	27,67 ± 2,006	64,40 ± 2,283	0,87 (High)	0,000*
2	27,07 ± 2,116	63,53 ± 2,460	0,85 (High)	

*with $\alpha < 0,05$

Based on the results of the data analysis in Table 7 it was revealed that the application of the HOTS assessment instrument was effective in fostering the ability of the student's SRL in the experimental class 1 and experiment 2. This can be seen from the N-gain in both classes of experiments that are categorized as "high" (Hake, 2002). In addition to independent statistical test sample t-test in both experimental class also obtained sig value (2-tailed = 0,000) means HOTS assessment instrument can be declared effectively grow student SRL.

DISCUSSION

Predicting factors have influenced the development of students' ability in organizing behavioral and learning environment between before and after learning in this study related to the assessment instruments used during the learning. The study was conducted by applying HOTS assessment instruments in the learning process. This means that during the learning process students are often trained HOTS problems so that over time the ability to think HOTS students develop the better. HOTS thinking invites students to be at a much higher level of thought than to memorizing facts or data, remembering something (recall) or explaining events exactly as the teacher exposes. As confirmed by Brookhart (2010) that HOTS thinking invites students to be in the realm of knowledge C4 (analyze), C5 (evaluate), and C6 (create).

The HOTS issue encourages students to think broadly and deeply about the subject matter, guide the linking between the materials in the lesson and use the information previously learned. It is as Newmann (1990) suggests, that HOTS thinking is an activity that challenges students to interpret, analyze or manipulate information. Further, according to Budsankom, et al., (2015) that HOTS involves various forms of thought processes. This is in line with Salbiah's statement, et al., (2015) that HOTS involves critical thinking processes, creative, logical, reflective, problem-solving skills, and metacognition.

When solving the HOTS problem students are required to have persistence, knowledge insight, reasoning strategies, expertise, and high creativity. Such learning climate facts are able to challenge students to continuously develop cognitive abilities and be more responsible for the learning process, so that students are personally active in regulating behavior and learning environment or self-regulated learning both in a classroom and home learning. Gradually students have a brilliant academic achievement so that they are increasingly motivated to be able to regulate anymore individually. This is in line with the opinion of Zimmerman (2002) that SRL emphasizes the importance of personal responsibility of students and controls the knowledge and skills acquired through the learning process. This fact is in line with the results of Noer's (2014) research that the provision of HOTS mathematics instruments (MHOTS) can improve the ability of junior high school student SRL. Further Kramarski,

B. & Gutman, M (2005) asserted that the application of metacognitive questioning as part of thinking HOTS is able to support the development of student SRL.

Another thing that allegedly influenced the development of students' SRL capability in this research is the items characteristic presented in the HOTS assessment instrument. Characteristics of items about HOTS assessment instruments in this study is contextual, meaning the item is related to solving real problems in everyday life. Characteristics of such items make learning more meaningful and more enjoyable for students. As a result, students feel challenged to be able to play an active role in the problem-solving process. This fact is consistent with the results of Lee & Yang (2014) study that the combination of environment-based learning and the setting of learning activities has an effect on the advancement of the student SRL. As Parma (2009) argues that realistic contextual learning makes students feel challenged to identify facts, formulate problems, create and express ideas, construct possible realistic solutions, and apply in various aspects of life. Finally over time students feel happy and become someone who wants to solve problems and diligently face learning difficulties. This is as supported by Zimmerman (2002) that the achievement of academic achievement is closely related to the students' personal ability and learning pleasure. In addition, Glynn, et al., (2005) also explains that academic skills and desire control are integral components of the SRL that comes from within the student. Further, Yang (1993) emphasized that students who study with SRL tend to be more successful than learning through program control.

Further suspected to affect the student's ability to improve students' skills is the discovery learning model used in the learning process. Discovery learning invites students accustomed to finding the source of learning information, find understanding of learning, and conduct learning activities based on regularity and awareness independently. Through the habit of finding yourself to make students have the knowledge and be responsible for themselves. This is in line with Schunk & Zimmerman's (2003) opinion that self-directed learning has implications for the capacity of students in self-regulation during learning.

In order for the independent learning process to take place well, students need to set goals, make plans, choose strategies, monitor the process, evaluate results, and suppress various learning disorders. This learning fact is supported by Hosnan (2014) statement that discovery learning can maximize students' ability to think systematically, critically, logically, and analytically. This is in line with the results of research by Roll & Winne (2015) that learning analytics in the discovery learning model is revealed to help students understand, evaluate and support self-regulated learning in individually.

In addition, the next factor that predicted to affect the ability of student SRL in this research is the application of assessment for learning with feedback strategy. Through the assessment of learning that is carried out during the learning can be known strengths and weaknesses of learning, both by teachers and students. With learning weakness information, teachers can perform various corrective action measures and students know the gap between learning achievement and learning objectives. This is as revealed by Young (2005) that assessment for learning is able to function as a vehicle that can provide information to students related to mistakes made during the learning. Further, according to Assessment Reform Group (2002) that assessment for learning activities are not focused on the results of the assessment, but rather aimed at students' understanding of knowledge, application of things, understanding of ways and achievement of learning objectives.

In the assessment for learning when students make mistakes in achieving learning objectives, teachers can provide feedback directly so that the feelings arise in the students. Similarly, when students do the learning process correctly also requires feedback, so feel appreciated and able to increase self-confidence (self-efficacious) which ultimately has implications for the achievement of self-competence. As Brown (2004) emphasized that feedback is the "heart" of the learning process. Sadler (1989) further stated that feedback is a key element of assessment for learning. This fact is in harmony with the results of Nicol & Dick (2006) research that the strategy of giving feedback in the assessment for learning helps students control the way learning becomes self-regulated learners.

The emergence of learning facts such as feelings of attention, appreciated, and confidence in self-competence proved able to improve student's learning motivation. With the motivation of students able to eliminate various pressures or learning disorders, willing to take action and dare to be responsible for the learning activities undertaken so that ultimately can develop the ability of SRL. As confirmed Winne & Nesbit (2010) that motivation is the most important dimension in developing SRL. Further Smith (2001) made it clear that motivation is central to self-regulated learning. The habit of self-regulation in learning is able to transform students into self-regulated learners (Zimmerman & Pons, 1986).

Furthermore, when referring to the results of focus group interviews with students that basically revealed the fact that there is a linear relationship between students' responses in learning with the ability of SRL. For example, student A of the experimental class 1 suggests that:

"At first, I really do not like learning to use the questions that invite thinking hard, this is because there is feeling dizzy and lazy to learn. But over time I feel comfortable after learning using HOTS questions. I can absorb the

lessons well. The HOTS questions invite me to think critically so I have to be more diligent to read books anymore. Besides, there is a problem that has made me fooled so that I can find out where the error and spur to think more broadly."

In line with the above statement is student B of experiment class 2 reveals that:

"The problems in learning are not easy, so I become more motivated and more active at home. The problems can not be solved by thinking once but by thinking over and over again. If I do not understand learning then I cannot answer correctly. So I have to read a lot of books and dare to ask if I do not understand."

CONCLUSION

Based on the above description, it can generally be argued that after the application of the HOTS assessment instrument as assessment for learning the students have a very high ability of SRL in managing the behavior and learning environment both at school and at home so that it can be concluded the application of HOTS assessment instrument is effective in growing the SRL Junior High School students especially in Basic Competency of human circulation system.

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EFFICACY OF GRAPHIC ORGANIZER ON JUNIOR SECONDARY SCHOOL STUDENTS' PERFORMANCE IN COGNITIVE WRITING SKILLS

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ABSTRACT
This study investigated the efficacy of graphic organizer on junior secondary school students' cognitive writing development skills. The study also determined the influence of school type and gender on the performance of students taught with graphic organizer (GO). The study was necessitated because of the problem of non readable hand-writings of the pupils in junior secondary schools. The quasi-experimental design which involved the pre-test, post-test, control group design was employed for the study. The research sample was drawn from two randomly selected junior secondary schools from Ile-Ife, Oyo State, Nigeria. Students from the sampled class were further stratified along gender. The instruments used for collecting data were Graphic Organizer Achievement Test (GOAT) and the graphic organizer (GO). Graphic Organizer Achievement Test (GOAT) was pilot tested for reliability using the test-retest method of three weeks interval and Pearson Moment Product Correlation coefficient analysis revealed a reliability coefficient value of 0.78. The two hypotheses were tested using t-test. Findings indicated that, students taught with the graphic organizer performed better than those taught with conventional method. It was shown that the gender of pupils was not a factor in the performance of students when they were taught with Graphic Organizer. Based on the findings, it was recommended that teachers should used Graphic Organizer in teaching Cultural and Creative Arts to enhance students' performance.
Keywords: Graphic Organizers, Cognitive Writing Development, Public and Private Schools, Gender, Junior Secondary Schools, Cultural and Creative Arts

Introduction

Learning is a shift from one behavioural act to another through experience, this is achieved when relative and useful information is delivers in systematically way to learners' cognitive sense in an organized, meaningful and useable format (McElroy & Coughlin, 2009). Reading children start with the reciting and identification of the twenty six letters of alphabets, this further leads to construction of words in different disciplines. An alphabet is the foundation on which Graphics Arts is built, and a very prominent aspect in visual arts. Graphics is an aspect of Creative Arts taught in the primary schools within the context of Cultural and Creative Arts (Usman, Odewumi, Obotuke, Apolola, & Ogunyinka, 2014). Graphics utilizes alphabets and visual or images to communicates idea and concept, it is conspicuously seen everywhere because the captions facilitates e-learning enhancement through sense of sight (Miller, 2011). Therefore, it is pertinent for learners to be tailored towards learning with the world of graphics and especially letterings and visuals from early stage.

In another word, graphics is a designing of alphabetic concepts. It belongs to non-verbal instructional media through which learners acquires crucial information and concepts (Githua & Nyabwa 2008). Along with this statement, Zaini, Mokhtar and Nawawi, (2010) explained graphic organizers as a fraction of instructional media which emerge to substituting words articulated in linear form into visual structural updates of a designed content for easily assimilation by the learners.

Katayama and Crooks, (2003) explained that graphic organizer is relative perfect in describing changes that carried out within the scope of visual in educating young one within the education process and method. It is a showcase of different visual affairs of learning content of concepts and ideas. It also a guardian to learner's thinking and reasoning which is established on a stronger visual map or diagram.

Although, Hall and Strongman, (2008) submitted that graphic organizers is said to be a unique package, instant solution provider to learning difficult topics easily. Graphic organizer is unique tool of representation, illustration and modeling of information in visuals or graphics form in instructions. In essence, graphic organizer take proper care of students to identify the missing information or absent connections in one's strategic

thinking (Ellis, 2004). Student embarking on graphic organizers as learning tool also assists them to see related facts in learning. Studies has confirmed that graphic organizer is mostly available for giving knowledge to learners, elicits progressive instruction and fun, rather than involving them in the traditional learning mode.

Researches confirmed effectiveness of graphic organizer in some disciplines such as Home Economics (Alshatti, 2012), Sciences (Kristina & Condidorio, 2010), Science and Technology (Ayuerdi, Nakiboslu, Ozayin 2014), Mathematics (Mercer & Miller, 2003; Githua & Nyabwa (2007), Writing (Sundeen, 2007; Jasmine & Weiner 2007.), Health Education (Kools, Van de Wiel, Ruiter, Cruts, & Kok, 2006), and Social studies and special candidatures (Cleveland, 2005). Furthermore, students with learning disabilities also benefited from graphic organizer (Dexter & Hughes, 2011). In addition, Lovitt (1994) attested to the relevance of graphic organizers in organizing and highlight the essential content information on Vocabulary and Writing (Karsbaek, 2011). Meanwhile, most if theses studies suggested that learners should be given the privilege to develop individual creativity to the optimum possible, for the benefit of their future and communities.

In this regards Burke, (2007) submitted that creativity is bringing new and imaginative ideas into reality through the involvement of learners in critical thinking. Grosvenor (2007) explained that creativity shows case in the personal exhibition of creative imaginative behaviours and innate ability to produce something out of anything. Thus, creativity by learners is determined by their level of exposure to instructions.

Obviously, every learner begins to acquire basic learning skills from early age through day to day interactions with elders and their mates, storytelling, singing, pointing to and mention the names of objects and scribbling (Bohrer, 2005; Daimant-Cohen, 2007). Writing is imperative in child learning developmental process that further articulate knowledge, for feelings efficiently in the skill. Legibility of handwriting of learners is correlated with literacy skills and writing composition. Whereas cursive handwriting belongs to a skill and road map, through which the learners' thoughts and actions can be tailored right from birth through life education.

At this juncture, the educational establishment should be seen to plays a role model in writing, through training of instructors by the experts or competence hand (Hunt & O'Donnell, 1970; Cahill, 2009; Graham, 1999; Tompkins, 2004). Writing is acquire through constant repetition, moreover, the more the students form the habit of learning the more the writing skills is perfected and expressions are fluent and efficiently. The learners regular connection with their instructor coagulate and give way for the developing of the cognitive skills which in turn inspire the legibility process and ideas of the learners (Richards, 1990; Cresewell, 2008).

Learners' writing can be improved through constant repetition and copy of graphical works and pictographic wordings this in turn assists in instruction strategies. Classics, originality and imagination are recognised with higher valued through creative writing, these further assist in given space to fabricate words content in unique to the beginners (Oberman & Kapka, 2001; Brookes & Marshall, 2004; Mak, & Coniam, 2008).

Instructor should inculcates avenue for the learners to become individual through writing habit formation on regular practices this will promotes, constant reading and elicit creative writing exercises. In line with this, Smith, (2000) further presented five writing stages as prewriting, drafting, revising, editing and publishing. Nevertheless, Oberman and Kapka, (2001) stressed that the constant visitation of writings by the learners fosters legibility, improves writing skills, and helps attaining good writing process in learners. Writing is a skills and also a talents which is of paramount to learners life education, because it helps learners to articulate their belief, `facts and view efficiently, this can be monitored from the cradle till the end (Smith, 2000; Zampardo, 2008; Tompkins, 2004).

Like the architect of creative writing, graphics are also seen and prominent everywhere. It is the illustrator and representative of information, data or knowledge intended to present vital information to targeted audience. It is further classified as a storytelling which people use to visualize and illustrates knowledge, experiences, in logically manner. Whereas, graphics is an extremely effective and powerful means of communication over traditional means (Fernando, 2012; Myers, 2013; Gallicano, Ekachai & Freberg, 2014). It is also the way visual information which is built on data or knowledge that intended to present crucial and complex information very urgent and clearly, it also combines beautiful visuals along with rich text to delivers clear messages of effective communication anywhere and anytime (Doug, 2004; Bostock, 2010).

The basic form of Creative Art is the ability to appreciate the beauty and quality of the nature within the environment and to skillfully restructure the natural environment by transforming the visual objects and materials into objects of greater value (Kalilu, 2013). Nevertheless, objects, materials and visuals are of paramount trend in educative instructional packages. These have contributed a great development in bringing

strong impact to learners' educational needs, characteristics and pedagogy in implementing instructional procedure. Graphic elicit positive response mostly among the pupils in legible letterings, clear visual and the bright colours involves (Sewidan & Al-Jazar, 2007).

Recently, Nigerian students' handwritings were not legible and their style of writing was not encouraging. Legible writings foster permanent learning which graphic organizer promotes. The knowledge of good lettering is essential for reading and writing; construction of wordings and books. To promote effective graphics, there are several studies on graphics organizer and education globally. For instance, Stephanie Miller (2011) examined the impact of graphic organizers on pre-writing tool to increase students' writing proficiency, the study projected graphic organizers as a media of improving the students' legibility.

In another development, Meera and Aiswary (2014) explored the efficacy of graphic organizers in writing among the secondary schools; the results confirmed the graphic organizers as a great developer of the English writing skills among the learner. Josiah and Adaramati (2015) submitted that teacher efficiency is measured by the outcome of his students' performances therefore, researchers suggested the learner-centred approach with appropriate interactive technology devices for impacting knowledge to the young ones.

Generally, studies established the positive influence of graphic organizers on the comprehension and reading of learners with disabilities. Kim, Vaughan, Wanzek, and Wei, (2004) submitted that judicious use of graphic organizers in teaching process influence students' reading problem among the disable students. Also, Kools, van de Wiel, Ruiter, Cruts, and Kok, (2006) reported that the use of text in health education increased reading comprehension. Chohan, (2011) reacted to negative that poor handling of writing skill will have on the future generation of learners' developmental stage. However, the extent to which the motivational graphic organizer package in teaching of creative writing can enhance instructional delivery among the junior secondary students in Nigeria is still unknown.

Therefore, the study sought to determine the influence of motivation on graphic organizer instruction in teaching creative writing among the junior secondary students in Ile-Ife, Osun State. Nigeria. The study further determined the influence of gender on the performances of students taught with graphic organizer.

Research Hypotheses

The following two hypotheses were formulated and tested at 0.05 level of significance:

1. There is no significant difference in the mean performance score of students in public and private junior secondary school students taught using graphic organizer.
2. There is no significant difference in the mean performance score of male and female junior secondary school students taught with graphic organizer.

Methodology

This study was a quasi-experimental type of post-test, control group design. The target population for this study was the second year junior secondary creative arts students in Ile-Ife, Nigeria. Purposive sampling technique was use for selecting two junior secondary schools based on the following criteria: Year of Enrolment (Junior Secondary School offering creative arts for the past five years); Facilities (Creative Arts Studio); Manpower (Experienced creative arts teacher); and Electricity (Uninterrupted Power Supply).

The instruments for this research were the treatment instrument "Graphic Organizer (GO)" and the test instrument, "Graphic Organizer Achievement Test (GOAT)". Graphic Organizer, was built on the ideology of Instructional Design. However, Babalola, (2007) explained that the Instructional Design (ID) is an organized procedure for producing educative, training and instructional programme.

Morrison, Ross, and Kemp instructional design model was adopted for this study. It has nine stages ranges from identifying instruction design problems to evaluation the instrument. Graphic Organizer was a self-instructional, interactive package stored in a Compact Disk (CD) and projected using multimedia projector. The package contained the operating buttons such as: Stop, Play, Next, Pause, and Previous to provide easier control of the package. The package was used for six weeks.

It contained six topics which include: Element of Design, Family of Alphabets, Gothic Letterings, Lower Case, and Upper Case Letterings. The validation and evaluation of the package was done by Fine and Applied Arts experts, Educational Technology and Computer Science specialists. They conducted face and content validity of the package by scrutinizing the: visual appearance, operating system, tenses, readability, and clarity of the

package.

Graphics Organiser Achievement Test (GOAT) was pilot tested on some selected sample that shared the same characteristics with the final sample used for this study. GOAT contained 50-item multiple choice objective questions with five options (A - E) drawn from past question papers of National Examination Council (NECO), Basic Education Certificate Examination in Nigeria.

Experimental Procedure

The objectives and modalities of the experiments were well specified and operational manual guide were adequately provided for the teachers and students. The students were exposed to graphic organizer instruction. The graphic organizer instructional package was projected via projection screen for the experimental groups. The students were instructed to be mindful and take notices of instruction provided on the graphic organizer package. The treatment for the group lasted for six weeks. After six week treatment, GOAT was administered as posttest.

Results

Hypothesis One: There is no significant difference in the mean performance score of students in public and private junior secondary school students taught using graphic organizer.

This hypothesis was tested using t-test statistic to compare the mean scores of public and private junior secondary school students' taught with graphic organizer. The result is shown in Table 1.

Table 1: t-test comparisons of the mean scores of public and private junior secondary school students taught using graphic organizer

Variables	No	Mean	SD	df	t-value	p-value
Public Junior secondary School	30	4.00	12.10			
				58	.781	.381
Private Junior secondary School	30	15.10	2.50			

Table 1 presents the t-test comparison of the mean scores of public and private junior secondary school students taught using graphic organizer. The mean scores for the public secondary school were 4.00 with standard deviation of 12.10. The mean scores for the private secondary school were 15.10 with standard deviation of 2.50. The t-value of .781 was not significant at the .381 alpha value ($t = .781$, $df = 58$, $p > 0.05$). This indicates that there was no significant difference between the public and private junior secondary schools taught using graphic organizer. Hence, hypothesis one was not rejected.

Hypothesis Two: There is no significant difference in the mean performance score of male and female junior secondary school students taught with graphic organizer.

This hypothesis was tested using the t-test statistic to compare the mean scores of male and female junior secondary school students taught with graphic organizer. The result is shown in Table 2.

Table 2: t-test comparisons of the mean scores of male and female junior secondary school students taught using graphic organizer

Variables	No	Mean	SD	df	t-value	p-value
Male Students	31	15.10	2.45			
				58	.385	.537
Female Students	29	14.00	2.09			

Table 2 presents the t-test comparison of the mean scores of male and female junior secondary school students taught using graphic organizer. The mean scores for the male junior secondary students were 15.10 with standard deviation of 2.45. The mean scores for the female junior secondary school students were 14.00 with standard deviation of 2.09. The t-value of .385 was not significant at the .537 alpha value ($t = .385$, $df = 58$, $p > 0.05$). This indicates that there was no significant difference between the male and female junior secondary school students taught using graphic organizer. Hence, hypothesis two was not rejected.

Discussion of findings

The findings revealed that there was no significant difference between the public and private junior secondary

school students taught with graphic organizer. Similarly, there was no significant difference between the performance of male and female students taught with graphic organizer. This finding is in line with that of Levasseur and Sawyer (2006), Jones (2009), Michelle (2013) and Nsofor and Momoh (2013), Alabi, Emmanuel and Falode (2015) that students attention are more captured through slides, projected visual image, motion pictures and developed electronic instructions irrespective of gender. The finding agrees with the findings of Clark (2007) which revealed that graphic organizers helps students to understand difficult concepts, generate thoughts, and ideas.

The finding is also in congruence with that of Karsbaek (2011) who reported that graphic organizers enhance students understanding during their early scribbling, inscription and life-long writings. However, the finding disagreed with that of Egan (1999) and Baxendell (2003) who stated that graphic organizers will cause students to become confused and disorganized in their understanding. It also agreed with that of Robinson and Molina (2002) who stated that, students who studied graphic organizers performed worse on the visual task and auditory task.

Conclusion

The graphic organizer enhanced the performance of public and private junior secondary school students' taught with graphic organizers in creative writing. Similarly, male and female junior secondary school students taught graphic organizer in creative arts performed equally better. This implies that, graphic organizer is gender friendly. This study proved that teaching students with technological tools like graphic organizer improved students performance in creative arts irrespective of school type and gender.

The implication is that graphic organizer (GO) offers an individual technology-based pedagogical strategy to learner, which provides an efficient and effective teaching that facilitate the learning acquisition skill in various cognitive aspect of knowledge. Creative writing can be better taught and learned through the utilization of the graphic organizer within the Nigerian junior secondary primary school context.

Recommendations

The following recommendations were proffered based on the findings:

1. Secondary school teachers should be encouraged and trained to use Graphic organizers in teaching Creative Arts. Instructional process and activities should be designed to accommodate the use of Graphic organizers in the classrooms. Also, teachers should be able to integrate Graphic organizers into their lesson.
2. Government should create more awareness through seminar and workshop on the use of Graphic organizers in schools. There should also be a production unit in the Ministry of Education or Educational Resources Centre across the country where Graphic Organizers would be produced.

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ENGAGING GLOBALLY DISTRIBUTED VIRTUAL TEAMS THROUGH COLLABORATIVE ENVIRONMENTS

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ABSTRACT
In order to understand how globally distributed teams can best work in online collaborative environments, the authors conducted a survey of those who have worked collaboratively in cross-cultural environments. The authors wanted to determine how collaboration was defined and what elements affected positive outcomes in those collaborations in order to produce best practices for online collaborative work in a cross-cultural environment. What was found is that training, time, and patience were essential for positive outcomes in a cross-cultural online collaboration. This paper introduces different ideas for training for this type of work, ways to think about technology, and ways to integrate collaborators and technology. Future implications require that technology be less Western-centric and more globally responsive as well as having multimodal approaches to problem-solving.
Keywords: cross-cultural communications, technology, collaboration, online collaborative environments

INTRODUCTION

With the ever-increasing exchange of ideas, collaborations, and work products crossing national borders as well as a growing number of people engaging in cultural and linguistics differences, it is imperative to understand the dynamics of these exchanges. Equally important is to know how to implement best practices in online collaborative environments. To assess best practices for globally-distributed online collaborations, the authors surveyed respondents who have worked within educational and business-related globally-distributed cross-cultural / cross-language (referred to as cross-cultural for the rest of the article for brevity) teams to discuss the ways people communicate using technology in those interactions. The researchers reviewed how online connections allow multicultural collaborators to work together in collaborative environments that include traditional and nontraditional communication styles, examining the environments for clear communication and accessibility for globally distributed teams.

In order to fully explore and develop new ways of thinking about communication globally, the authors expanded on previous research to discuss how online collaborative communications have evolved over recent time. Throughout, the authors tried to understand how these environments support what is known about quality engagement in cross-cultural communications. Finally, the researchers proposed best practices for using different types of online collaborative environments within cross-cultural communications.

LITERATURE REVIEW

The literature in cross-cultural communication is vast, as is the literature on collaborations. However, combining the concepts of cross-cultural communication and collaboration with online communications in the context of a community is relatively new given the different communicative structures in use today. In cross-cultural communications, the ways collaboration, communication, and community are defined can be very different than simple Western-centric definitions of each of those terms. In today's work and educational environments, it cannot be assumed that the working group is homogeneous, nor that even if everyone is from the same country that they speak the same language and/or dialect, nor that each participant considers collaboration, communication, and community to be the same as their peers in the collaborative group. That the extent of the heterogeneous groups expands with the introduction of collaborative technologies necessitates the need to define what is meant by collaborative environments, cross-cultural communications, and distributed communities. By necessity, definitions need to be framed in terms of globally distributed collaborations in online environments and the best practices put forward for those collaborations.

Collaborative Environments

In the past, collaboration typically took place in face-to-face settings where ideas could be shared and acted upon

quickly. In discussing the collaborative classroom, Bosley (1993, p. 52) defined collaborative groups as "those in which groups of three or more students create one written document and receive both a group grade for the product and an individual grade for their participation in the process." In Bosley's case, she worked with international students in what she defined as predominantly "Euro-North American" (which she uses to denote "white middle-class males whose values and cognitive frames are those that dominate educational paradigms") face-to-face classroom environments (1993, p. 52). However, collaboration has become a more complex term that requires an understanding of the setting of the collaborations and the participants in order to define it fully.

The technological affordances also require a shift in how collaboration is considered. Paretti, McNair, & Holloway-Attaway (2007) wrote that "collaboration in distributed environments involves more complex dynamics than colocated work" p.329). Paretti, McNair, and Holloway-Attaway also asserted that

> students do not only need a list of specific communication tasks or formats to help them succeed in globally distributed teams; they also need metaknowledge to help them understand the dynamics of such teams and the roles of communicative acts in supporting or sustaining such teams productively (p. 330).

In other words, students in globally distributed collaborations needed to understand all elements of the collaboration, including what roles each collaborator assumed and how communication was able to support the collaboration.

With new technologies, collaboration has expanded to include digital collaborations. What was occurring face-to-face began to take place in email, chat, and discussion boards, which then developed along with the technology to include wikis, instant messaging, and dynamic online documents. Today, not only are many of these same tools engaged for collaboration, but the toolbox has expanded to include video chats, augmented and virtual reality, and interactive 3-D videos that have the ability to screenshare, engage written chats, and integrate concept maps within the engagement space, and to include multiple attendees. These environments have created a venue for idea sharing in alphabetic and graphic formats with the ability for users to read social cues, such as facial expressions, to interpret the collaborative intentions more clearly, but this also demands ways of communicating more effectively. O'Brien, Alfano, & Magnusson (2007) argued for three factors that must be included for effective online collaborations: "dedication of focus to task on hand; simulated proximity to the communicators; close transparency of medium" (p. 129). Indeed, the need for attention to the ways collaborators are connecting is the most important step of the collaborative process. For instance, during the writing of this article, the authors used Google Hangouts to focus on the task: the development and writing of the article. The sole objective in those meetings was to engage in collaboration (dedication of focus). While two of the authors worked in Arizona, the third worked in Minnesota, so the video portion of Hangouts simulated proximity. This not only allowed the authors to brainstorm quickly, but to also process information and outline, document, and write from that processing as a group. Finally, the authors understood the limitations and affordances that must be given to the medium (transparency). As each of the authors is experienced in online education and digital processes, they knew with technology comes unforeseen problems (throttled access, for instance), so expectations and workflows were adjusted to accommodate for those issues, even if it meant turning off the video to engage verbally only.

Cross-Cultural Communication

In discussing cross-cultural communication within collaborative settings, defining what is meant by communication is the foundation of the collaborative connection. To that end, it's also important to understand how culture is defined, and what that means for each of the collaborators within the globally-distributed team.

Culture

While many definitions of culture exist, "general agreement exists that culture is an established set of values and a way of thinking and behaving that is passed from generation to generation" (Bosley, 1993, p. 53). Paretti, McNair, & Holloway-Attaway (2007), Thorne (2003), and Hunsinger (2006) postulated that culture is not a stagnant concept and, as such, needs to be adjusted for consistently as ongoing communication develops. What they call for is a space, "communication zones," within current online environments with a focus on that collaborative element (Paretti, McNair, & Holloway-Attaway, p. 348). But, is this putting too fine of a point on the ever-changing concept of culture? "It is best, then, to think of culture not as one thing or another, not as a *thing* at all, but rather as a heuristic" (Scollon, Scollon, and Jones, 2011, p. 3). If the term "culture" is used as a heuristic, ways thinking about cross-cultural communication can be developed that change depending on the needs of the collaborators and not on a concrete version of what that communication should mean. In the researchers' case, Google Hangouts was used as the communication zone, developing communication in face-to-face (via video), chat (within the video window), and documentation (within the Google document) to enhance the collaborators' communication zones, shifting between each as the situation and collaboration required.

Communication

The term "communication," is also complex, especially in cross-cultural communications, and is, necessarily, dependent on those defining the term. Scollon, Scollon, and Jones (2011) explained that

> The meanings we exchange by speaking and by writing are not given in the words and sentences alone but are also constructed partly out of what our listeners and our readers interpret them to mean (p. 11).

Communication, then, is also a heuristic by which to establish a common ground in which to collaborate, always dependent on the environment within which the collaborators are engaged and the collaborators themselves.

Distributed Community

As has been seen in the areas of collaboration and communication, globally distributed teamwork is dependent upon the development of community and the interactions of those within that environment. Hoegl, Ernst, and Proserpio (2007) found that "team member dispersion increases as teams find it more difficult to perform high-quality teamwork (p. 156). Historically, the development of globally distributed communities has been inhibited by the ways the collaborators connect to one another, yet establish their own place within that community. Paretti, McNair, & Holloway-Attaway (2007) insisted that "identity construction in cyberspace" is imperative in negotiating the communication within globally distributed teams. O'Brien, Alfano, & Magnusson (2007) stated that "users increase their sense of personal accountability through engaging with a real audience" (p. 127). What is required, then, is a sense of personal identity and accountability that engages others within the collaborative environment. In the development of this manuscript, for instance, each of the authors, researchers in their own areas, came to the collaboration with some disciplinary expectations regarding the ways collaboration would occur within each of their communities. The authors had similar expectations because of their shared perspectives as academics who work within the United States. What hadn't been expected was to find that perspectives shifted as each author explored ideas and the others contributed. Cultural differences contributed to these shifts (One author is an immigrant to the United States and a non-Native English speaker. Her perspectives gave the group new insights into how this article, and the ideas about it, could be approached.). Chen, Caropreso, Hsu, and Yang (2012) confirmed that the ways group participants behave and engage are predicated on perceptions and cultural experiences, noting that participants tend to migrate toward those who are more similar to themselves, and that group identification may be situated within "factors such as ethnicity, occupation, and religion" (p. 27). In the authors' case, each person identifies as an academic with a focus in online collaborations, which established a set of expectations and identification in the ways collaboration was approached. Wang (2011) suggested that in order to create community, collaborators need to be matched carefully, two non-native to one native speaker, and control group sizes, small group sizes, in order to facilitate better cross-cultural communication (p. 254). These restrictions help develop better communication and understanding.

Engaging the Individual

Collaborative work isn't only about the environment or projects, but about engaging individuals from different backgrounds with a common goal in the types of communication and work that are necessary for that collaboration. Survey responses for this research and research by Paretti, McNair, and Holloway-Attaway (2007) agree that the ways individuals have been engaged in collaborative work in the past has been focused on some similar themes: common goals, trust, and motivation. By using new technologies in collaborative online environments, new ways of thinking about collaboration must also be engaged. This becomes even more important when engaging in cross-cultural collaborations.

Visual mediums, such as video calling or virtual reality, introduce new ways of engaging the individual in collaborative environments. Individuals working on collaborative works in cross-cultural settings have different needs than those working in homogenous settings and the technology can make the difference in how successful those encounters are for all of those involved, including a "greater sensitivity, understanding, and ethical awareness in order to bring about positive international and social relations" (O'Brien, Alfano, & Magnusson, 2007, p. 128). The technology helps individuals create different types of connections with their fellow collaborators. Individuals using technologies can encourage more positive approaches to cross-cultural barriers. For instance, the authors noticed that on occasion the message was not being understood by one another if they only engaged in listening, but by engaging the video, each of the authors could see how the other person was speaking, what kinds of gestures were used, and when the silences were a pause for thought rather than for interjection. In addition, introducing different ways of sharing information (chat, screenshares, etc.) improved communication between the authors. "Since communication appears to be bound by cultural context, collaboration occurs only if communications were understood within the context and carried out through interactivity" (Chen, Caropreso, Hsu, & Yang, 2012). It is the interactivity of the collaboration that seems to play a key role in the success of the communication.

Cross-cultural Communication

The most important element of determining how globally-distributed groups work in online collaboration is in understanding cross-cultural communications and how those work within teams while reviewing how technology works within the communications. "Communication media used to support collaboration, ... are complicated when distributed work goes global because media are not culturally neutral" (Paretti, McNair, & Holloway-Attaway, 2007, p.333). Because so much of the available technology has been developed in the United States, that technology has culturally-homogenous roots and therefore has cross-cultural implications. Despite the varied modalities, genres, and dialects presented in online environments, the style of online communication developed with a Western-centric tone that requires those communicating in those spaces to adapt to that tone (Anson, 2012, pp. 149-150). There is an implicit expectation that anyone outside of the normed culture has to adapt to communicate within the norm, and to work toward a system of shared values and belief. However, there is a great potential for misinterpretation when those adapting are not native to the language and/or culture, despite their work to integrate successfully (Chen, Hsu, & Caropreso, 2006, p. 18). Each element within the communication, from the cultural expectations to the individuals to the technology, have an influence over the ways the communications take place, and if they are able to be successful.

Working within cross-cultural communities requires a different set of skills than working within a homogenous community. Not only do participants need to begin with the "position that differences exist" (Bosley, 1993, p.51), but participants must recognize that because of these differences, extra steps may need to be taken to communicate fully. According to Chen, Hsu, and Caropreso (2006), "Cross-cultural learning takes more processing time for effective communication, especially given communication context differences" (p. 27). Participants can't assume that everyone within the community is operating with the same expectations. Bosley (1993) demonstrated this in his example:

> In high-context cultures (Asia, for example) speakers use context to convey much of the information. More of the message is left unspoken and is accessed through non-verbal cues and interpretations of what is meant rather than what is said. In low-context cultures (the United States, for example), speakers are more specific and direct. Speakers do not rely so much on context to convey meaning, and listeners do not need to interpret so much. (p.55)

If participants are not using visual modes of communication, much can be lost in translation with significant social cues and non-verbal cues misdirected and/or misinterpreted by other participants. The needs of cross-cultural communication necessitate different approaches to communication, including additional time, cultural sensitivity, openness about differences, patience, and strategic planning to create a safe and productive space (Bosley, 1993; Chen, Hsu, & Caropreso, 2006). However, these affordances can also create a barrier to decision-making. Paretti, McNair, & Holloway-Attaway (2007) argued that while new technologies enhanced attention and motivation, key factors in collaboration, the technologies also decrease abilities to process information because complex concepts are discussed without time to analyze them, as opposed to asynchronous formats, such as written communications, in which participants have more time to think (p. 333). Chen, Hsu, and Caropreso (2006) argued that while written communication is useful when approached with the cultural sensitivity required of cross-cultural communications, the level of communication is not equal to that of face-to-face communications, which newer digital communication modes offer (p. 19). While it's important for the participants to have that sensitivity, it's also important to understand and use the technologies that adequately enhance these types of communications.

METHODS

This research addressed how people communicate in cross-cultural/cross-language interactions, using technology for those interactions. The research questioned how both synchronous and asynchronous connections allow collaborative work in non-traditional environments that include traditional and non-traditional communication styles, examining the challenges and successes in these environments for clear communication and cross-cultural accessibility for globally distributed teams. Objectives of the research were: to develop understandings of how communication across cultures worked in practice; and how individuals engaged in the practice viewed its meaningfulness and support of individual and team goals. This research was conducted with IRB approval and with written informed consent from each of the respondents.

Survey Development

Data was collected through an online survey developed in Survey Monkey©. This tool was used because of its availability to the researchers, its wide use, and its accessibility features. Regardless of the respondents location, access was available.

The survey, which collected open ended, qualitative data was developed to expand upon the technology based cross-cultural/cross-language understandings reviewed in the literature. Because terminology can differ by

culture, the survey began by asking participants to interpret the ideas of collaboration, collaborative environments, and cross-cultural collaborations. Respondents were next asked to relate technologies role in cross-cultural collaborations, how it benefits or inhibits collaboration, and what experiences in these environments have taught them about best practices in technology mediated cross-cultural collaborations.

Respondents

In order to garner the largest pool of respondents possible, the researchers identified specific collaborative teams at their institutions. These collaborative teams were emailed information about the intent of the study and a link to participate in the survey. To expand upon the pool and gather as much data as possible, the researchers also identified specific listservs and groups within social media environments whose focus is technology-based global collaborations.

Twenty-nine individuals responded to the survey. Participants were from five countries, Canada, Israel, Sweden, Switzerland, and the United States and spoke eight unique languages, Chinese, English, French, German, Hebrew, Spanish, Swedish, and Swiss German. Respondents were also from a variety of educational and industry settings.

Data Analysis

Because the data for this study was anonymous, open-ended and qualitative, it was analyzed for its content in order to explain and describe technology-based cross-cultural collaboration. Content analysis in the research was used as the method for examining the data for patterns. Since we based the questions on ideas from the literature, we began with categories of collaboration, communication, community, cross-cultural communication, collaborative technology and shifts in collaborative practice. This expanded as we analyzed the data to include positive and negative representations within the categories and a new category of the cultural specificity of the technology in use.

FINDINGS

The survey provided in depth reflections of professional practice in cross-cultural environments with respondents who had been engaged in cross-cultural online collaborations for anywhere from very recent engagement (less than a year) up to twenty years of involvement. This diversity of practice led to some interesting responses for the different questions we posed and reflected contrasting approaches to globally distributed online teams in collaborative environments. This section will explore the themes that emerged through content analysis of the survey.

Collaboration, Communication, and Community

The dominant themes of collaboration, communication, and community were built-in to the questions. The researchers wanted to determine what respondents thought of these concepts, and how the concepts informed their ways of connecting in the online environments. Respondents were asked to reflect on what collaboration meant and to offer ways they engaged in collaboration. Collaboration was most often described as a way "to seek an active role, but to do so with regard to others' ambitions, skills, needs, etc.;" "to see the group dynamic as a tool to solve problems;" to develop a "reciprocity of relationship over time;" and to create "leadership shared equitably among participants." These responses were typical of those engaging in collaboration for lengthier time periods. However, one respondent, who had only been engaged in collaborations for a short period and was still trying to define what collaboration meant, stated "I understand collaborative environments as those that facilitate communication, so the environment can be a classroom, meeting space, or online." This demonstrates that the length of time an individual has participated in collaborative environments show an evolution of how the collaboration and/or environments are defined. When asked how one engaged in collaborations, the responses varied. Some respondents gave concrete ways they designed the collaboration to be as effective as possible: "Sometimes I am more explicit in stating the requirements and preparing responses in a way that leaves less confusion." Others considered the difficulties and benefits of using online collaborations, including the ability to blame miscommunication on the technology rather than the collaborators. In this response, the respondent indicated that the technology hindered progress:

> Sometimes it is not worth the effort to write a carefully crafted email to get an answer to a problem so I will continue to work on the issue myself. Sometimes I work with team members who are several time zones apart - and that is problematic.

Finally, some respondents were reflective in their practice: "You can never take for granted that you share the same understanding;" and "I believe even within my own culture there are personality and work differences to which I must attend." Overall, consideration toward fellow collaborators was a narrative that persisted throughout the answers to the survey.

Communication was, again, a concept that was fraught with ambiguity. Some respondents looked at communication as the different spaces in which information was shared.

> I am involved in a forum online with my colleagues, in this forum we help each other with information for our clinic and our patients, and ourselves, when someone writes something we all can respond or just participate in a silent way.

For others, communication was about breaking down barriers that may cause miscommunication and to develop a beneficial interaction. However, as the quote below demonstrates, culture has a prominent role in how communication has taken place amongst different groups and has required a level of reflection to understand differences in cultural and communication patterns.

> In my own culture, we have many ways to communicate because we understand more of the norms, and and with less words we can understand each other, which will be difficult with others from other cultures. However, in the same time with people from other languages and culture it is much more interesting and we both learn more from each other. We also can help each other in this shared opportunity.

One respondent added that "I may be less explicit with people from my own culture because we share similar values, and knowledge." This caused the researchers to question how the respondent defined the cultural norm, and how those who were outside of it were identified. Finally, the respondents to this survey were overwhelmingly reflective and considerate when discussing their practice.

> I believe we should always try to at least *imagine* who it is we're communicating with no matter the culture. This means listening/reading carefully, trying to understand perspectives based on what we know of the individuals involved, working to express ourselves in ways that either acknowledge when we are "culturally ignorant" or in ways that convey an awareness of other people's situations and experiences, etc.

This comment reflected the need to understand culture, which was not defined by the survey. It was also indicative of the need to assess the collaborative meeting space in order to connect better.

In the third theme, respondents reflected on how community is defined and how collaborators can connect better within a shared community. Respondents acknowledged that development of community has historically been inhibited "when leadership was not shared, when participants did not share similar commitments, when there was lack of transparency, and when there was lack of organization." Instead, they asserted, community requires a commitment to "understanding people from other cultures as well as the need to be aware of this aspect and how it impacts conversation and collaborative exchange." Community-building extended beyond those in the distributed team collaborations, however, and, at least for this respondent, included cross-institutional collaborative community building: "we would like to be able to share resources that are owned by universities across university contexts." This topic was not addressed by those who were responding from industry roles, however, which may speak to the different types of cultures surrounding education and industry.

Cross-cultural Communication

In discussing cross-cultural communication, the emphasis is placed on cross-language with special attention paid to the ways languages are translated and information is shared through translation.

> I've had to think more about how I express myself, to make sure that what I say will make sense when translated. I've had to think more about whether the issues I raise or solutions I suggest are culture-specific, and whether that's appropriate, or whether it needs to be re-thought for the objective we're working toward.

Many respondents suggested that differences must be addressed through "frequent questioning and assessing understanding," and "better negotiation of every step in a collaborative process," with "greater sensitivity to difference." The most salient comment was about listening and giving time: "Listen. Move forward slowly unless there is an urgency to a project. Let other people take the time they need. Some cultural norms value consensus, some discussion, some friendliness and social exchange." While this respondent was comfortable in adjusting for different needs, this is not always how the respondents reflected on the collaborations.

In some cases, respondents indicated that they were not completely comfortable working within cross-cultural collaborations. "There is a lot of baggage that international students bring in terms of hierarchy and other issues when working with faculty." Others argued "part of being a good collaborator is being willing to accept difference -- both in practice and outcome." More often, however, respondents were interested in how to progress and create practical solutions to issues that arose through cross-cultural communication:

> We try to write multi-lingual messages when possible and to translate standard texts and videos to the common languages represented in our group (or at least include grammatically correct/typo-free subtitles on our videos so that others can try to use the auto-translate). We try to present examples from different parts of the world when relevant. We make sure to clarify things like what measurement system we're using, what currency we're referring to, and when mentioning or linking to products or other resources we look at how available they are in the relevant parts of the world.

The use of videos, linking, and auto-translate incorporates the ways that collaborative technologies can improve communications in distributed teamwork.

Collaborative Technology

The survey asked about the ways respondents engaged with technology and, if they did, what types of technologies they incorporated into their distributed online cross-cultural collaborations. When asked about collaborative technologies, most respondents were specific about online versus offline, and what was be needed by the collaborators. Several respondents commented that technologies increase the "facilitation of access" and "the ability to focus communication." When asked about the specific technologies used in collaborations, one respondent discussed physical space as the prime concern in offline collaborations: "office space, school spaces, community spaces both public and commercial (libraries & cafés, for example), as well as "natural" spaces -- the woods, the local trails, etc." This same respondent commented about online technological spaces, where collaborators could meet synchronously to discuss the collaboration, including "the now defunct ciLabs (community informatics virtual labs--Drupal-based); Moodle spaces; various online forums; various online wiki projects" but also included technologies that are not often considered spaces of congregation, but storage and/or asynchronous tools such as "mailing lists; group email exchanges; shared Dropbox folders." What this shows is that online collaborators emulate face-to-face best practices for collaboration by using tools strategically for their needs.

Respondents were also cognizant of the different restraints placed on online collaborations and how collaborative technologies can facilitate the ability to connect with others.

> When participants remain separated by space and time constraints, online spaces allow access to synchronous and asynchronous work. At the same time, such environments offer access to incorporated diverse online tools to enhance our work together. Each of us adds something to the mix, which makes the whole greater than the sum of its parts.

Some only use collaborative technologies to improve traditional face-to-face collaborations. The ways technologies are used in these collaborators is only to improve the communication when collaborators are separated geographically. One respondent commented that tools like Skype or Adobe Connect allow the collaborators access to one another when they cannot meet personally. "For collaborative work within my company face-to-face contact is essential." This speaks to the different ways collaboration takes place and how technologies are considered for those needs.

Cultural Specificity of Technology

Within the technology collaborations, respondents also focused on how technologies are incorporated into their collaborations. As one survey respondent commented,

> ...software that is made by Americans for Americans, with annoying culturally myopic limitations such as character encoding issues or only allowing imperial measurements or using iconographic imagery that only make sense to particular cultures.

In fact, one respondent suggested that "the ability for participants to write in their own language and be understood via auto-translation tools (however imperfect)" as a top priority in distributed cross-cultural online collaborations. However, if participants use different tools to facilitate the collaboration, what can occur is what another respondent defined as "collaboration fatigue," a condition of group collaborations. Collaboration fatigue was defined as two separate groups using two different environments using different conventions that don't always translate well.

Finally, one respondent suggested that the quality of the collaboration had little to do with the technology and its specificities. "I find that, in general, productive or positive collaborative exchange depends more on the people involved than the technological affordances or constraints." What this means for the collaborations is that clear communication takes on a more significant role in the practice of collaboration.

Shifts in Collaborative Practice

Respondents were clear about the ways their interactions have shifted over time as they engage in more distributed cross-cultural online collaboration. These shifts have not only affected the cross-cultural collaborations, but also how the respondent collaborates in his/her own culture, and what it means to be culturally sensitive. "There is no such thing as "universal" culture, but there are ways to broaden one's courtesy and compassion and knowledge, and I try to find those ways." Beyond courtesy and compassion, respondents shared practical knowledge that has helped them be more effective collaborators. One respondent commented on how appreciation of different people's needs and ways of expressing themselves has changed the way the respondent listens, including slowing down the conversation so the respondent can "understand more about the person." Respondents also commented on how self-reflection enables them to collaborate more effectively.

> "I look for what is different from my assumptions -- how am I surprised? I try to understand where and how that surprise originated -- what did I just learn? I try to understand what would be perceived as courteous, what would be perceived as caring, and what would be perceived as too much or inappropriate."

Finally, respondents state that there are specific ways to facilitate collaborations by being "more explicit in stating the requirements and preparing responses in a way that leaves less confusion;" "understanding...what someone else is saying is...informed by what I know about them, whether this is gender, profession, generation, culture, etc.;" and "having expectations for collaboration and its goals clear and defined by consensus." By understanding these practices, a set of best practices for globally-distributed teams in online collaborative environments can be developed.

DISCUSSION

Best Practices

The researchers see choosing technology that works well with the type of collaboration the team will be doing as one of the fundamental issues in approaching globally-distributed teams in online collaborative environments. Postman (2000) and McLuhan (1994) advocated for the ways technology can change the culture and interactivity of the users of that technology. Postman (2000) wrote that the medium chosen "gives form to a culture's politics, social organization, and habitual ways of thinking" (p. 10), and that new media transformed culture completely. McLuhan (1994), in writing about computers (which can be applied to online communications), said they create interconnected communities in which disparate individuals and cultures create new definitions of community. The ways technology can change the approaches to communication encourage critical thinking about why technologies are chosen. When the dominant culture, especially in a global marketplace, becomes myopic, guaranteeing quality communication and/or collaboration becomes nearly impossible, especially given the ways technology influences community building. The problem is not only within software design, but also with those who implement its use "to focus their institutional missions on enhancing students' abilities to communicate effectively, especially through the use of emergent digital technologies in the language that many linguists believe is becoming the world's lingua franca, English" (Anson, 2012, p. 140). While English may be the current lingua franca, it is short-sighted not to encourage thinking about collaborations in different ways using different modes of communication, whether that is a spoken language, alphabetic texts, graphic texts, or visual displays. It is more appropriate to consider who is involved in the collaboration, what language best fits the collaboration, and what technologies will best facilitate the collaboration. Thinking about the modes of collaboration critically is where the implementation should begin, and not at the time of the collaboration itself.

Engaging Collaborators and Technology

The first step to engage collaboration in cross-cultural dialogues is to prepare the participants for the environment. Most of the respondents in this survey wrote that they had never received any training to work within cross-cultural collaborative environments, and had to teach themselves how to navigate them. This usually meant making mistakes before being successful in the collaboration. These days most individuals have some level of cross-cultural exposure, especially if engaged in online social media, but this doesn't mean that users are experts, nor even skilled, in collaborating in a cross-cultural communities.

To introduce cultural training to students with whom the researchers work, students are encouraged to collaborate by first, getting to know one another. This is done in both face-to-face collaborations and online collaborations. This can be as simple as introductions, if the collaborators are familiar with one another, or it can be fairly complex discussions that exist throughout the collaborative process for those getting to know one another. Wang (2011), in teaching collaborative groups of American and Taiwanese students, encouraged his students to create video stories consisting of one minute video including basic personal issues like family, friends, and habits, but also including "something related to their own cultural heritage" (pp. 246-247). Group members were then required to

respond to the videos posted on YouTube to connect with that cultural foundation. This allowed the students, who would be collaborating all semester, to begin with some sense of understanding about their fellow collaborators and encourage productive learning communities. "Participants in such groups can exchange information about the communication styles of their culture, can become sensitive to the behavior and thinking strategies of all members of their collaborative group, and learn strategies to recognize and control problems inherent in such cultural interactions" (Bosley, 1993, p. 62). While this assignment is very limited, it creates a foundation for understanding on which to build for the remainder of the collaboration.

Once collaborators have an idea of the cultural differences, it is helpful to begin communicating directly. Video discussions, which can also incorporate text chat and screensharing for alternative modes of interaction, are most helpful in communicating complex concepts; "face-to-face communication, or something as close to it as possible, can be central to creating the social and professional context that makes distributed collaboration possible" (Paretti, McNair, & Holloway-Attaway, 2007, p.332). Using tools that allow for simulated face-to-face discussions, such as video or the use of avatars, or actual face-to-face communication encourage the participants to engage in verbal and non-verbal communications, thereby alleviating some of the issues that low-context cultures have when communicating with high-context cultures.

As relationships develop and social norms and expectations are created, the purposeful implementation of multiple technologies can be integrated throughout the teamwork. As one respondent commented, collaboration is strengthened through "the ability to combine synchronous and asynchronous exchanges more seamlessly, so that people in various time zones can coordinate more efficiently; the ability to share resources more widely and draw on the strengths of people much farther afield rather than resorting to whoever is locally the most convenient." By considering all of the potential needs of collaborators, including time differences and communication styles (synchronous and asynchronous, alphabetic, graphic, and video), the collaborators are more likely to find ways that work best for each of them in order to be productive.

Future Implications

Current video technologies include real-time closed-captioning and transcripts that can enhance the communication between collaborators. Some future iterations of video collaborative tools include auto-translation that translates in real-time. While these are positive additions, they do not account for cross-cultural issues that may arise. Language is only one barrier to good communication. Understanding the different levels of communication, verbal, non-verbal, alphabetic, and graphic, will help collaborators become more successful in their online collaborations. Furthermore, it is important not to rely solely on brands of technology for effective communication and collaboration. Not only are these apt to go out of date quickly, but as one respondent commented, there are "challenges when relying on proprietary software products in that they can cause long-term sustainability issues when no longer affordable or when group size gets to be too big."

CONCLUSION

The researchers began this study thinking about specific platforms, software, and apps used in collaborative work. However, as the research progressed one key point became clear: the focus shouldn't be on the technology, but on the dynamics of the group using the technology, and how those needs will develop the ways technology is integrated. What individuals must be taught to assess their specific situation, to develop a plan, and to then move forward with the technology side of the equation, making sure that the technology is inclusive for all of the members of the collaboration, and not focused only on the dominant culture or language. It is only at that point will the collaborators feel the technology is assisting rather than hampering their work.

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Wang, C. M. (2011). Instructional design for cross-cultural online collaboration: Grouping strategies and assignment design. *Australasian Journal of Educational Technology*, *27*(2), 243-258.Engaging Globally Distributed Virtual Teams through Collaborative Environments

FOSTERING STUDENTS' SELF-REGULATED LEARNING THROUGH SELF AND PEER ASSESSMENTS

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ABSTRACT
"Strong isn't about having a million strengths, rather it's about facing and dealing with our weaknesses". ~ Unknown. Is our education system allowing our undergraduates to face and deal with their weaknesses? Or are we taking the students for a leisure walk in the park in higher education while neglecting essential lifelong learning skills for their future? This paper focuses on students' progress and development in terms of their skills through self and peer assessments. In this study, students were encouraged to identify their weaknesses and areas of concern based on one of the assessments given to them in the course. Then the teacher and peers used these concerns as an assessment tool to provide feedback to the students. Through this activity, it was found that the students were very goal-oriented and were able to notice their 'progress' – the key to learning. These assessment tools help students to realise that learning does not just stop at one point but happens continuously throughout their lives by reflecting on their lifelong learning skills. The outcome of this study could be useful to assist teachers to set self and peer assessment tasks as part of their course for every level in higher education.
Keywords: Self-Regulated Learning, Lifelong Learning, Assessment, Feedback, Reflective Practice

INTRODUCTION

This is a reflective journey of a teacher who wanted to devise assessment approaches that encourage self-regulated learning (SRL) skills. Butler & Winnie (1995) mentioned that SRL skills include the ability to attend to teachers' remarks and peers' contribution as well as to monitor discrepancy between current and desired performance. These are the skills that the teacher wanted to see developed in her students.

The teacher was interested to incorporate SRL into the curriculum design because she realised that students need the 'will' to learn and the 'skills' to learn in order to be self-regulated learners. As a teacher, she felt that she is still in control of developing the students' skills to learn. Since assessment is a motivating factor for students, the teacher believes that the SRL skills could be developed and encouraged through appropriate assessments.

It is important to highlight that lifelong learning skills (LLL) and SRL will be used interchangeably in this paper. This is in view of the European Commission (2001), LLL refers to all learning activities undertaken throughout life, with the aim of improving knowledge, skills, and competence within a personal, civic, social and/or employment-related perspective. This reflects the two important components of SRL as well – the 'will' to learn and 'skills' to learn. Therefore, it cannot be denied that SRL and LLL are interrelated.

This paper analyses a year 2 course, Communication Skills, for undergraduate students from the School of Science and Technology. It was realised that the nation's goal of producing lifelong learners may have to be reflected in the assessments and subsequently in the transferable skills. The next part will explain the aspects which led the teacher to emphasise self-assessments and peer assessments in her teaching practice.

Problem Statement

In reference to the latest Malaysian Education Blueprint 2015-2025, one of the goals highlighted is that the education system has to strive to produce **lifelong learners** so that learning does not stop only at one point but it happens continuously and constantly throughout one's life. Even, one of the institution's educational goals targets students to become independent, **lifelong learners** who actively pursue knowledge and appreciate its global application to economic, political, social and cultural development. Subsequently, the Program Educational Objective (PEO) and Program Learning Objective (PLO) of Bachelor of Psychology (BPSY) Program were analysed. PEO 4 aims to produce graduates with interest in research and lifelong learning and PLO 7 aims to produce graduates who are able to pursue life-long learning in psychology-related fields. These objectives are related to one of the Malaysian Qualification Framework (MQF) descriptor which is to produce graduates who possess independent study skills to continue further study with a high degree of autonomy.

The question raised here is whether the goals are evident for the teachers and students especially in setting the right type of assessment. This is in view of Boud & Falchikov (2007) who mentioned that it is necessary to frame assessment not in terms of individual student's perspective, but in terms of the intentions of the institution. If the nation's goal and the institution's goal is to produce lifelong learners, then the objective should be reflected through the assessments in every level of the higher education setting. It is also crucial for academicians to make

the goals transparent for the students to understand and work towards achieving the nation and the institution's goal.

Therefore, the recommendation that is proposed here is to incorporate self-assessment and peer-assessment as formative assessments of the course. Self-assessment and peer-assessment encourage SRL skills and to a certain extent, these approaches become effective when they are used together. Falchikov (2007) emphasised that peer-assessment is sometimes seen as a mean of developing self-assessment skills.

One of the arguments for promoting student self-assessment in higher education is that it equips students to become lifelong learners who can evaluate their own performance after they have finished formal study (Brown & Glasner, 1999:116). This is exactly what our nation and institution echoes.

There are many challenges teachers may face in implementing self-assessment and peer-assessment. However, the concern here is about the validity and reliability of self-assessment and peer-assessment. In terms of self-assessment, Boud and Falchikov (1989) realised that high achievers were prone to underrate themselves and low-achievers may do the opposite. In terms of peer-assessment, the main concern is the friendship effect which can lead to over-marking (Sluijsmans et al., 1998). Because of these reasons, the teacher in this research decided to use these approaches only in terms of formative assessment. Brown and Knight (1994) highlighted that formative assessment contributes to self-directed learning and intellectual autonomy as learners start negotiating with tutors the areas of strength and weakness and eventually becoming more reflective. Formative assessment also focusses on the process of learning than the product itself. Students also obtain better results when they are working toward process goals rather than product goals, and when tracking progress toward overall goals of learning (Schunk, 1996). Incorporating self-assessment and peer-assessment as part of formative assessment also promote learners to progressively correct, improve or enhance their knowledge by themselves according to the need of the assessment.

METHODOLOGY

At the end of the semester, 30 students were asked to complete a survey with the intention of finding out if the practice of identifying areas of concern was helpful or useful for the students. The questions were created as open-ended in order to capture the participants' true perception in relation to self and peer-assessment activities. The students' responses were analysed and divided into different themes.

Ethical consent has been obtained from the students for this research. The students had a choice to be anonymous. Since the activity is based on formative assessments, students' grades were not at risk even if their responses were not favourable to the research. The participants clearly understood that the teacher wanted to know if there was progress in the students' learning through self and peer assessments.

The Transformation of Teaching Practices

This section explains how self-assessment and peer-assessment were incorporated into the teaching practices as part of formative assessments which eventually leads to summative assessment. The teaching practices leading to one of the assignments are highlighted here:

Assignment: Persuasive Speech

This assignment contributes 25% towards the total coursework marks. For this assignment, students have to present in a group of 3 to 4 members a persuasive speech using appropriate visual aids. The usual practice of the teacher is to show students the seniors' sample speech and have a discussion based on the assignment criteria that would have been given to them earlier. Subsequently, if time permits impromptu speech is carried out with teacher's feedback.

The changes in terms of teaching practices were made based on the 'future driven self-assessment' approach proposed by Tan (2007). This type of assessment encourages students to develop lifelong learning skills. According to Tan (2007), future driven self-assessment is a form of assessment that has the power to sustain itself beyond completing the programme of study. Through this process, students may construct their own assessment criteria where it promotes students' capacity for exercising their own judgements. This is quite different from the teacher-driven or programme driven self-assessment where the expectation comes from the teacher or programme but in future driven self-assessment students look beyond academic.

Chart 1 shows the progress acquisition process which helps students to go through self-assessment and peer-assessment systematically. Besides, it can be noticed that this process helps students to be more self-regulated learner by encouraging them to be active learners. As mentioned by Boud (2007), it is crucial for learners to utilise the information from feedback to complete the feedback loop and to contribute to the building of an understanding

of how to utilise information from others effectively. As mentioned earlier in this paper, this is what Butler & Winnie (1995) emphasised that SRL skills include the ability to attend to teachers' remarks and peers' contribution as well as to monitor discrepancy between current and desired performance. The proposed progress identification steps (Chart 1) help students to complete the feedback loop by becoming more reflective. With this, eventually, students will acquire the skills of identifying their progress which is the key to learning.

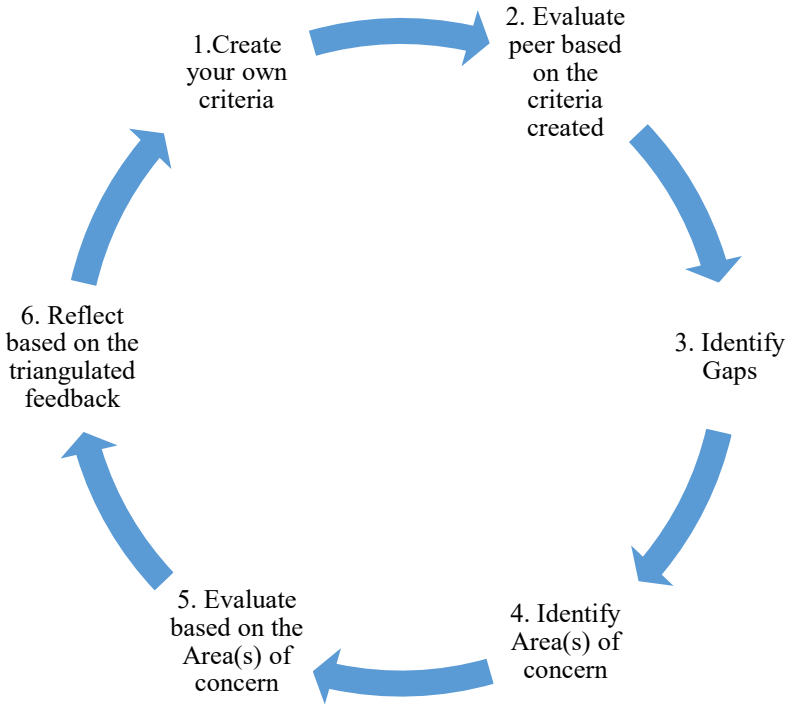

Chart 1: Wheel of Progress

Table 1 explains the teaching practices the teacher used based on future driven self-assessment. The first column of the table is connected to the points identified in the *Wheel of Progress*.

Stages as stated in the *Wheel of Progress*	**Timeline of the semester**	**Teaching practices**
1. Create your own criteria	Week 1	Students were individually asked to create their own marking scheme that reflects the criteria that they would assess if they are being evaluated for a speech. Students' criteria were shared through OneDrive document according to tutorial classes for peer feedback. Students discussed the criteria with peers and at this point, some students added some points that they did not highlight earlier. It was realised that some students highlighted aspects that were their strengths and weaknesses based on their past experience.
2. Evaluate peer based on the criteria created	Week 2	The students were shown a video of their seniors' speech and the students evaluated that based on their own criteria. When they gave feedback to the teacher, she asked more questions for them to reflect. This gives the teacher an opportunity to understand what the students meant. It also models the questions that the students could ask the teacher later when she gives them feedback in class.

3. Identify Gaps	Week 3	Only then the summative assessment marking scheme that is being used for the semester were shown and the students were asked to highlight the parts that they did not mention in the criteria that they identified in Week 1. This helped the students to identify the gaps.
4. Identify Area(s) of Concern	Week 5	The students were asked to identify their *Areas of Concern* in terms of speech. These are the areas they are worried and concerned about based on their previous public speaking experience.
5. Evaluate based on the Area(s) of Concern (*refer to Appendix 1)*	Week 7 & 8	Impromptu speech practice was carried out individually. The teacher used the items identified as *Areas of Concern* as the criteria for impromptu speech feedback. The teacher also asked the students to choose a peer to provide feedback based on the areas of concern. During the impromptu speech, the speeches were also recorded using the students' own gadget for self-assessment.
6. Reflect based on the triangulated feedback	Week 9 & 10	The teacher encouraged the students to view the video of their own presentation and asked them to evaluate and reflect on the comments given by the peer and teacher. This is where the feedback process is completed when the students utilise the feedback from the teacher and peer by identifying their own progress.
	Week 11 & 12	Summative Assessment – Persuasive Speech Presentation

Table 1: Timeline of Teaching Practices

FINDINGS AND DISCUSSION

This section reveals the findings of this study. The responses from the participants were categorised into different emerging themes as follows:

Assessment aligned with the future

As Boud (2007) mentioned teachers must do more than just aligning assessment with the subject objectives but it is necessary to also align assessment with the future. Initially, before the self-assessment and peer-assessment activities were carried out, the teacher was concerned if students would be interested but it was amazing to realise that many students were interested when it was emphasised that these tasks are relevant and useful for their future. In view of that, Boud (2007) also highlighted the importance of making explicit links to the future in learning is vital. Some of the students highlighted that they were happy that there is a goal to achieve instead of blindly preparing without understanding the need for the future. Some of the students' feedback is as follows:

1. *It helps me to focus on improving my weaknesses instead of practicing and preparing blindly.*
2. *It helps us to monitor ourselves.*
3. *It was very helpful as it enabled me to know clearly what to work on and how to work on it. By doing so I was able to improve my presenting skills.*

Progression from one point to another

It can be noticed from the students' feedback that they were able to identify and progress from one point to another. When the students are given the opportunity to identify their areas of concern, the students have started to monitor or notice the gap they have. According to Andrade & Evans (2013), noticing is a form of self-regulated learning skill in that learners must notice their own and others in order to recognise where they need to make an improvement. They also added that noticing helps learners to set goals, monitor progress, and change performance. These are the skills that are necessary for learners in higher education.

Besides that, through this self and peer assessment activity the teacher at times realised that the concerns that have been identified by the students are no more the concern during the impromptu speech practice because the students have decided to put in more effort to improve the weaknesses. This is in line with Harris & Brown (2018) who mentioned self-assessment assist learners to put in more effort or try effective strategies when dealing with challenging task.

The following excerpts prove students' realisation of the importance of progression:

1. *It was helpful because when I compare my impromptu speech video with my actual presentation video, I can observe significant improvement in my presenting skills. I can feel myself improving even though there is still room for improvement. The impromptu speech made me aware of my own weakness such as fidgeting and poor gesture, so I can notice it and find a way to improve myself.*
2. *It guided me well throughout my preparation for the presentation. I felt more confident in terms of the preparation, however, I feel that there are certain areas that I should improve on. Besides that, identifying areas of concern made me realise that I was weak or I was good in certain areas.*
3. *It helped me to be conscious of my weaknesses during the preparation as well as during the speech itself.*
4. *Make me realize if I was stuttering too much or too much movement so I can control better during the real presentation*

Triangulation of feedback

Another important aspect of the recommended task in this paper is the triangulation of feedback. It can be seen that the students are getting feedback regarding their areas of concern or any effort to improve from the teacher, peer and the student themselves. From Table 1, it can be observed that the teacher is providing feedback from the beginning of the task formation. However, the important aspect is when the students get feedback from the teacher and peer during the impromptu speech as well as when the students get to record the video of their own presentation and assess it on their own. The application of this feedback is crucial for the students because it allows them to progress. There are three sources of evaluation of the same performance. At this point, the students may agree or disagree with the feedback obtained from the teacher and peer and identify a plan to progress before their summative assessment. The following responses from the participants of this study reveal that they were appreciative of the fact there was more than one source of feedback:

1. *It made me reflect and reassess on previous presentations. I had a visual sketch board of my current presentation abilities and ideal presentation abilities. Remarks by teacher and peer helped to identify my blind spot and give direction as to what is expected/ should be avoided in future presentations.*

2. *The practice was helpful for me because, before the practice, I always thought that I lacked confidence, lack of English proficiency, always nervous and have trouble with time management during the presentation but after the practice, I get the feedback from my lecturer as well as my friend which shows me that confidence and feeling nervous are not a problem for me and I should not pay too much attention to that, however, I should pay more attention to the "true" problem like keep swaying and walking around. So during the practice before persuasive speech presentation, I kept reminding myself not to sway too much.*

LIMITATION

There is a need to mention that there were a handful of students who did not want to participate in the future driven self-assessments as these were just formative assessments. Hence, for this group of students, regular discussions were planned and they were fine with it. This made the teacher realise that diversity is an issue to be looked into. It is believed there will be more and more issues related to diversity that teachers have to take into consideration as student population is getting diverse day by day (Biggs and Tang's, 2007). In regards to this, perhaps teachers should be prepared beyond aligning assessment with just intended learning outcome. Since the student population varies in terms of culture, personality and learning abilities, teachers should be informed to be observant about unintended or unexpected learning outcome (Biggs and Tang's, 2007) or even emergent learning outcomes (Megginson, 1994) as well.

CONCLUSION

This paper has proven that teachers can be innovative in creating assessments. As highlighted by Bols (2012), it is sometimes very convenient to use the form of assessment that has been tried and tested so the acceptance of trying something new may be frowned upon by different parties who are involved in setting up assessments. Having said that, this paper gives the confidence to teachers that innovation in assessment is possible particularly to encourage learners to be more self-regulated.

This is crucial because identifying progress in learning helps students to improve and transfer the knowledge learnt from one course to another. Besides, it helps them to be engaged in the assessment instead of looking at assessment merely as a transitory tool to complete their studies.

Hence, it is best to emphasise identifying progress is the key to learning. Academicians should align the learning outcomes in accordance with the nation and institution's goal. However, that alone will not be sufficient. This is because the right type of assessments has to be devised in order to fulfil the goals and eventually produce students with 21st Century Skills.

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Appendix 1

Speech Evaluation Form based on Student's Areas of Concern

Presenter:

Impromptu Speech Title:

No.	Areas of concern	Presenter's Plan	Comments by Teacher or Peer
1.			
2.			
3.			
4.			
5.			

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INFORMATION NEEDS AND SEEKING BEHAVIOR OF DISTANCE LEARNING UNIVERSITY STUDENTS

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ABSTRACT
This study was undertaken to find out the information needs and information seeking behavior of distance learning university students in Khyber Pakhtunkhwa. The study used the questionnaire-based survey method. Snow ball sampling technique was used for data collection. It was found that their main information needs and seeking behaviour were related to "Lectures", "Information relating to their programs of study", and "Completing assignments". The internet and library were the main channels for meeting the information needs of students; however the usage of the library was infrequent. Among various information sources available to the students, the heaviest reliance was on books and lecturers/tutors, but the usage of electronic resources such as e-journals and databases was very low. Search engines which were the most used individual tool for searching their needed information and mostly students preferred the English language when they sought information. Print format was their preferred format for the required information. Computer and information technology skills were insufficient at best they needed formal training from the institutions. A majority of the students faced barriers when attempting to acquire their needed information. The main barriers were lack of institution library for off-campus students. The outcome of this study will be beneficial to academic institutions in facilitation of information needs for students.
Keywords: Distance Education, Information Needs and Seeking Behaviour, User Studies, Distance Learning University Students

1. Introduction

It is a common belief that the current era is the information era. Libraries have been at the hub of this information based activity. Libraries, both online and physical, have come to be considered as the main information centers. There have been great changes in the formats and availability of information during the past century which has compulsorily led to libraries becoming the main information source.

The formal system of education is squirming under rigidity regarding enrollment. To relieve the pressure on the formal system of education and the increasing demand of the community, higher education institutions have been encouraged to introduce off-campus education system. Many universities are now offering both distance and regular education programs for students around the world. Education on the basis of correspondence, more commonly known as distance learning or open learning is not a new concept. It dates back to the 19thcentury. Nevertheless, a number of changes/improvements have been seen in the methodology of this type of education. The most conducive changes have taken places in the last two centuries and even now there are a number of positive changes taking place in this area of education. The most important changes which have arisen in the last few years have been caused by the development and rush of information and web based technologies.

On-Campus students have the means to fulfill their information needs from their own institutions but there is a need to pay attention to distance learning students because their institutes provides them print and electronic materials for readings, writing assignments and preparations for final examination. However, it has not been ascertained that what are their actual or real information needs, from where they fulfill their information needs, what is their seeking behavior and which channels are used by them to satisfy their information needs. Adequate information about information needs and seeking behavior of distance learning students is helpful and essential for the administration in development of the resources, course content, services and facilities for students especially in developing countries like Pakistan.

2. Literature Review

The stage of information needs starts when someone feels an insufficiency of the clarity of the topic at hand. Other models of information needs contend that the information need is initiated when the subjects' plans a statement

relation to the specific information needs. Even so, at times the information need stage begins when a comprehensive and definite research statement gives rise to acquiring information. (Borgman, 2000).

Several studies have been conducted to examine the information needs and information seeking behavior. Arif and Mahmood (2009) conducted a study in order to signify the level of satisfaction with reference to distance education tutors. The areas which were emphasized were the location/physical setup, library collection and various characteristics of the regional campuses (such as the services and resources provided). The study also looked into the main library networks of Allam Iqbal Open University (AIOU) in Azad Jammu Kashmir, Pakistan. The result shows there was a need for providing proper library building and resources. The respondents also suggested that the university should arrange information literacy trainings programs for the tutors.

Oladokun and Aina (2009) looked into the information needs of continuing students at the University of Botswana. They also highlighted the barriers in fulfilling these information needs through the available information sources. They used a questionnaire to ascertain the information needs of this group. The findings of the study showed that the main information needs of the respondents were related to: documents specifically linked to their course of study and level of study, information needs about career development and information on sponsorship of scholarships for further education. These were the important areas of their information need. Other findings of this study showed that the main barriers to the use of information are the lack of a well-equipped library and lack of time.

Jumani and Bhatti (2012) in their study on "Use of libraries in open and distance learning system Barriers to the use of Allama Iqbal Open University libraries by tutors and students" surveyed 4606 tutors and students. The results of the study indicated that both kinds of respondents, both on campus and distance learning students, faced various issues like inappropriate library timing, distance between library and their residence, unavailability of the latest journal, lack of required material and the latest books and inadequacy of the library staff . They suggested that library timings be increased, latest books and journals be made available as well as computer and internet services. They also proposed inter library loan and resource sharing services with other academic libraries.

A study was carried out titled "Information needs and information seeking behavior of social science graduates students in Malaysian Public Universities by Thani and Hashim (2011)". The study aimed to find out graduate students real information needs and their seeking behavior. In this study data was collected through questionnaire consisting of closed-ended questions. A total number of 400 questionnaires were distributed of which 354 (89%) respondents completed the questionnaire. The study's results showed that the majority of the graduates seek required information on the spot for filling in their knowledge gap.

Qureshi and Khan (2008) surveyed the information needs and information seeking behavior of Pakistani university students. Data was collected through a questionnaire. Educational and cultural background, the environment and the participatory nature of the students were the main factors which brought about specific information seeking behavior in the students.

Oladokun (2010) focused on finding out the "Information seeking behavior of the Off-Campus students at the University of Botswana: a case of two satellite centers". Data was collected from two centers of the university 100 out of 274 students were selected through random sampling technique. The result of the study showed that most of respondents (71%) preferred printed format of information rather than electronic, audio and video formats. Other findings showed that (90%) of students considered the lecturer to be the most important information source for acquiring information, (71%) followed their colleagues, (58%) students used reference and text books, (50%) used library resources, (43%) gather information from TV and radio, (25%) searched the internet, (16%) obtained information via telephone call, (10%) via e-mail and (1.3%) used other sources for the above discussed purpose.

Mahajan (2009) investigated the information seeking behavior of students and researchers at of Punjab University, India. The purpose was to examine the kinds of academic information needed by respondents, the sources they preferred, satisfaction with the collection of the library and the general information about searching for study related activities. A questionnaire-descriptive survey method was used for data collection. Data gathered from 250 users consisted of one hundred undergraduates, the same number of postgraduates and 50 researchers. The study found that books were the most preferred information source among the students but journals were the major source of information for researchers due to their research related information needs. Further, this study highlighted the fact that the internet and current journals were more preferred sources for researchers than students. The response of the

users about the preferred information format were also analyzed, electronic sources were ranked higher than print sources by the users. The users proposed training programs and orientation sessions for appropriate usage electronic resources.

Bukhsh (2010) surveyed the Allama Iqbal Open University student perception regarding teacher education through distance learning in Pakistan. A questionnaire was used for data collection. The research was conducted to highlight the barriers faced by distance students during teacher education programs in Pakistan. The findings of the study showed that teacher education students were satisfied with their institutions regarding admissions, materials/course books delivery system, tutors meetings, material quality, examination and the result system.

Oladokun and Ain (2009) found that distance students faced barriers during use of information. The results showed that the lack of a well-equipped library was the main barrier faced by 55% of the respondents. A similar study titled "Meeting the needs of distance learner" was presented by Sampson (2003). The respondents emphasized that limited books and old literature were the main problems for them. These problems were especially faced by students who did not have access to their institute library and other resources.

Khan and Shafique (2011) conducted a study on "Role of departmental library in satisfying the information needs among two departments of the Islamia University of Bahawalpur Pakistan". The study aimed to determine the students' information needs and available library services. A close-ended questionnaire was used to collect the data from 150 students of MBA and LIS regular students. The findings of study showed that the majority of the respondents agreed that well equipped and modern departmental libraries in each university department should be provided; it was also concluded that such endeavors would prove to be helpful in academic activities and for fulfilling the information needs of the students.

A study "*The role of academic libraries in facilitating postgraduate students' research"* was conducted by Rasul and Singh (2010) in order to examine the role of academic libraries in research and post graduate student and ascertain their views about their institute/university library. Four Malaysian public universities were selected for this study. The total population was 437 researchers and students of which 375 respondents returned the questionnaire, the response rate 85.8% was very good. With reference to questions about the use and access of library resources, the research findings indicated that most of the 247 (65.9%) respondents preferred to go to the library physically and some of them 44 (11.7%) fulfilled their information needs through online or remote access. At the end the researcher mentioned that overall the respondents were satisfied with the current library resources and service.

3. Objectives of the Study

The prime aim of this study is to present a comparative analysis of information needs and seeking behavior, however some of the specific objectives of the study are outlined.

1. To find out the information needs and seeking behavior of the distance learning university students in KPK.
2. To identify the information sources, information channels and methods used by the students for finding and getting their required information.

4. Research Methodology

The methodology employed in this study was the survey research method. It was used to gather demographic information of the respondents, their educational level and information needs and their specific information seeking behavior. The questionnaire was chosen for the study as it is more suitable for this kind of survey. It enabled the researcher to collect data from a targeted number of post graduate distance students of Allama Iqbal Open University and Sarhad University of Science and Technology Peshawar within a short period time.

Before the construction of questionnaire for the study, the researcher consulted and analyzed various research studies which were carried out on similar topics. Keeping in view the objectives of the study a structured questionnaire was developed for data collection which consisted of fifteen (15) questions. A pre-test was arranged for actual data collection to ensure that the questions were understandable and fit in with the purpose of the study. The pre-test was conducted in order to pinpoint the difficulties that may be faced by the researcher during the data collection. A pilot study which consisted of 10 postgraduate students 5 each at the SUIT Peshawar and AIOU was conducted. The results showed that no student encountered any difficulty in filling the questionnaire.

A total 200 hundred Master level distance students participated in this study from two universities one public and one private sector offering distance learning programs in Khyber Pakhtunkhwa. Different possible techniques have been followed in data collection from distance students. Data was collected by using convenient sampling technique. Permission was sought from the Management where necessary. Questionnaires were filled in various vocation self-administrated through visits to the institutions during classes, meeting in the departmental libraries and during workshops. Total 200 questionnaires were distributed and 194 completed questionnaires were collected. The data was analyzed by using Statistical Package for the Social Sciences (SPSS). The analyzed data was showed in the form of tables and charts which was further interpreted. The researcher then presented findings on the basis of analyzed data and pointed out some recommendations.

5. Result and Discussions

5.1 Respondents Demographics

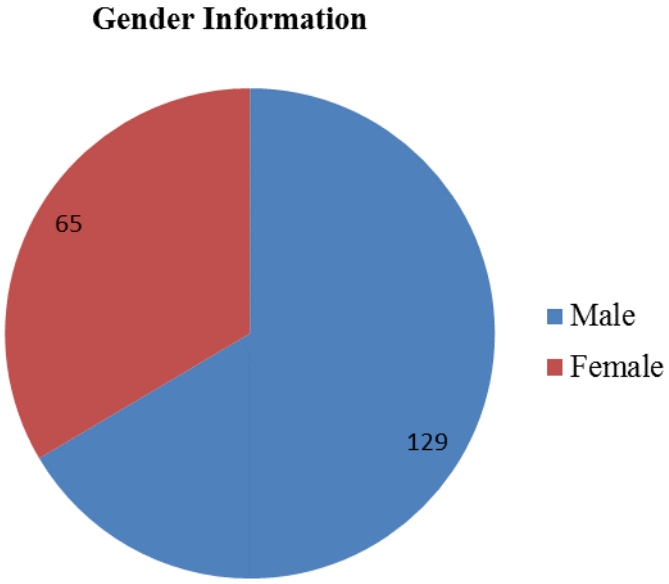

Figure: 5.1 Shows gender information of student (N=194)

Table 5.1 *Respondents Age Information*

Variable Age	F	%
<21	46	24
21-31	108	56
31-40	31	16
>41	9	.05

Table 5.1 shows that of 194 respondents 46 (24%) were below 21 years of age whereas the majority 108 (56%) were between 21-31 years and above followed by 31 (16%) in the age group of 32–40 years, and 9 (4.9%) were in the age group of 41and above years.

5.2 Respondents Information Needs and Information Seeking Behavior

5.2.1. Main kind of information required by distance students for their study

Table 5.2 *Frequency of main kind/source of Information (N-194)*

Source of Information	*Mean*	*SD*
Lectures	4.14	1.163
Course books	3.88	1.063
Others books	3.55	.927
Previous lectures notes	3.28	1.005
Others	3.25	1.174

Table 5.2 shows that distance students participating in the survey were asked to indicate what their main kind/source of information is. It was found that the highest demand was for "lectures" (mean score: 4.14), closely followed by "course books" (mean: 3.88). Other kind and source of information sought by distance students were: "others books", "previous lectures notes" and others kind of information.

Table 5.3 *Distance students main information needs*

Students main information needs	*Mean*	*SD*
Information on subject relating to their study	4.14	1.163
Information on job opportunities	3.88	1.063
Information on career development	3.55	.972
Information on scholarship for further education	3.28	1.005
Information on further education after post graduate program	3.25	1.174

Table 5.3 The students participating in the survey were asked to indicate what they looked for and what their main information needs is, using a 5-point Likert scale where 1 was 'Never' while 5 was 'Always'. It was found that the highest demand was for 'Information on subject relating to their study' (mean score: 4.14), followed by 'Information on job opportunities' (mean score: 3.88). Other types of their main information needs often sought by the students were: information on career development, scholarship for further education and information on further education after post graduate program.

5.2.2 Purpose of seeking information by distance students

Table 5.4 *Purpose of seeking information (N=194)*

Purpose of seeking information	N (%)	R (%)	O (%)	F (%)	A (%)
Completing assignments	5	6	8	21	55
For updating knowledge	3	2	5	38	52
Preparation for exams	2	1	14	22	61
Solving a problem at hand	6	15	43	15	21
Entertainment	27	29	23	14	7

Table 5.4 presents that the participants were asked how frequently they use resources for different purposes. It was found that 76% of the respondents were 'Always' or 'Frequently' using library and other resources for completing their assignment. Three other popular purposes were to for updating knowledge, preparation for exams and solving a problem at hand. The survey students were infrequently using library and other resources to get information about entertainment.

Table 5.5 *Preferred Language, distance students while seeking information*

Languages	F	%
English	142	73
Urdu	41	21
Others	10	5

Table 5.5 highlights the distance learner' preferred language of required information. The analysis of data shows that the majority of respondents 142(73%) preferred the English language and 41(21%) students preferred Urdu. Only 10 (5%) students preferred some other language for their needed information.

The result indicates that distance learners' preferred English language for their needed information.

5.4 Information Channels and Sources

Most important information sources for distance students

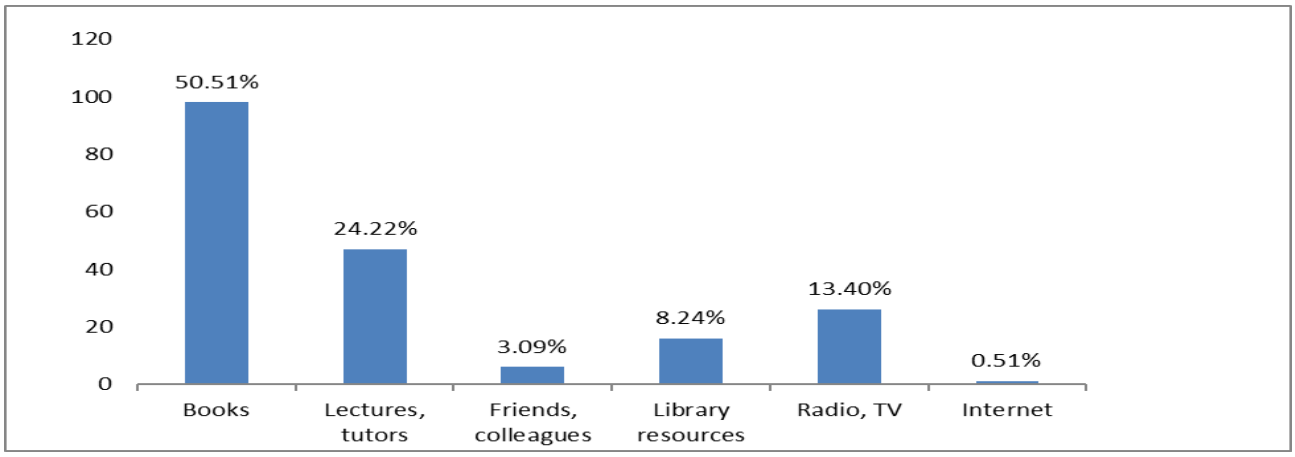

Figure 5.2 presents the distance student most important information channels/sources they prefer for their needed information. Respondents were asked to indicate the main information source they use for their information needs. A majority 50% of the students reported using books for their needed information. Another 24% of the participants said they use lectures and tutors, 13% Radio/TV, 8% library resources, 3% Friends/colleagues.

Table 5.6 *Preferred information formats for distance students*

Information formats	L (%)	L.P (%)	S (%)	P (%)	M (%)
Printed material	15	5	3	22	55
Electronic/Digital material	1	6	29	40	23
Audio-Visual material	3	9	47	29	13
Others	12	19	40	23	7

L=Least, LP= Less Preferred, S= Somewhat Preferred, P=Preferred, M=Most Preferred

In this age of internet and advancement in technology still printed materials popular in the students. It was found that majority of the students 77% 'most preferred' or 'preferred' printed materials' for their study. Another 63% of the students 'most preferred' or 'preferred' electronic /digital materials, 42% Audio-visual material and only 30% of the students 'most preferred' or 'preferred' others information formats for meeting their information needs.

Preferences of Information channels used by distance students for meeting their information needs

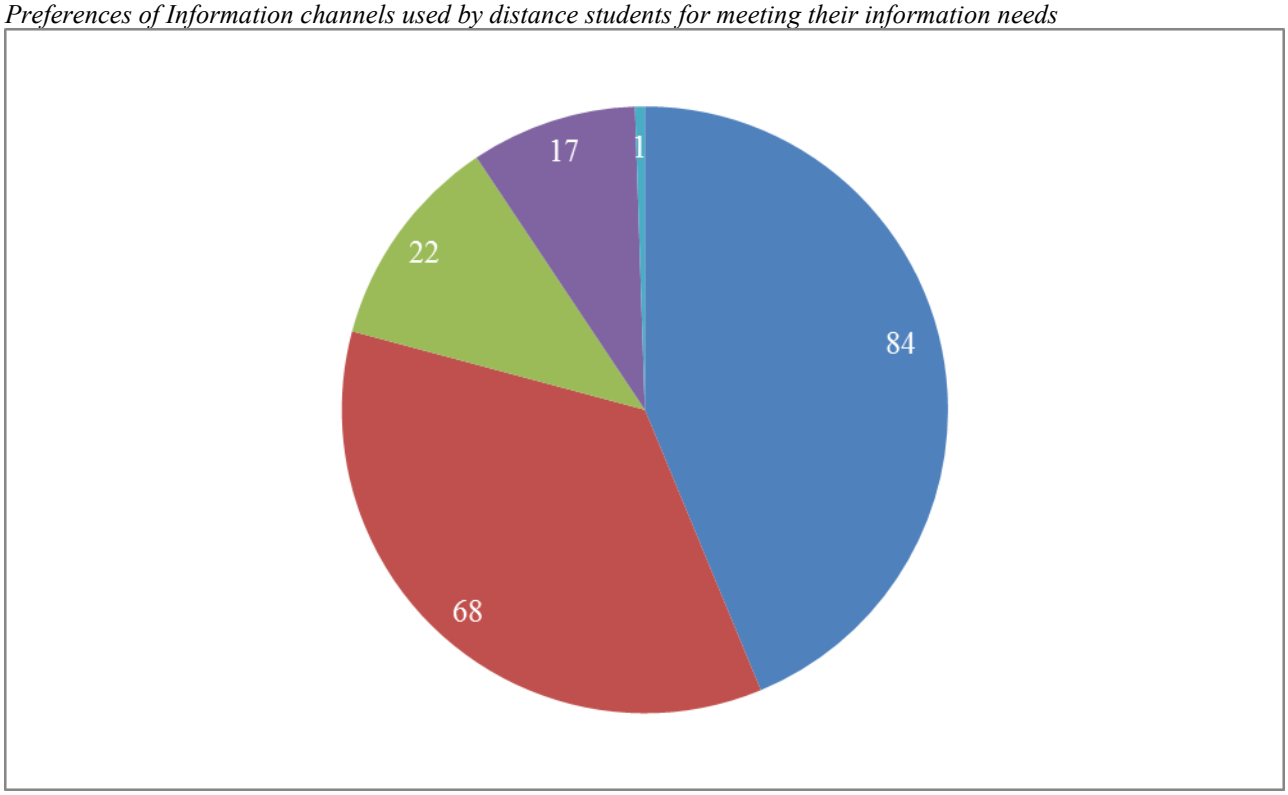

Figure 5.3 shows distance students were asked about which information channel they use first while meeting their information needs. The result indicates that most of the students 84% used library followed by Internet 68%, bookstore 22 and consulting knowledgeable person in field 17% respectively, they used first for meeting their needed information..

Table 5.7 *Tools used by distance students to search out information (N=194)*

Tools used to search	f	%
Library website	80	41.23
Search engines	88	45.36
Journals	12	6.18
Research repositories	14	7.21
Magazine	0	

Table 5.7 show the importance of different tools of information sources for searching out information. Search engines came at the top with a 45%, closely followed by library websites 41%. Use of different tools among students, search engines and library websites were the most important individual tool for searching information.

Table 5.8 *Methods for getting required information from the library*

Methods	F	%
Going to library personally	88	45.36
Calling the library	19	9.79
Sending Emails to the library	32	16.49
Other	34	17.52
Total	194	100

Table 5.8 shows methods for getting information from library by distance students. Most of the students 45% prefer going to library personally, 17% using other methods, and 16% sending emails to the library respectively. This figure is a big evidence for the concerns that distance students prefer going to library personally for getting information than other methods.

6. Conclusion and Recommendations

Academic libraries usually spend a significant amount of their budgets each year for acquiring a variety of information sources including online databases, books, journals, reports and reference sources, both in print and electronic formats. Emergence of new information formats and delivery channels are resulting in a rapid transformation in the information landscape. Although the surveyed students preferred lectures and using digital information sources, the low use of online databases was a matter of concern. There is a need for libraries to strengthen their promotion and user-education programmes to create more awareness about information resources available to students and instructors. It was also noted that the students were frequently using library, web search engines etc. for getting study-related information. Although the Internet provides fast and easy access to innumerable information sources, not all these sources are comprehensive, current, authentic and reliable. Academic libraries and business schools can collaborate to develop basic information literacy skills among their students which will be useful in the proper identification, selection, acquisition, evaluation and use of high quality information. This knowledge will also be useful for these students at their workplace as the use of quality information will help them undertake their responsibilities more effectively.

This study has been conducted in order to pinpoint information needs and information seeking behavior of distance students. The following recommendations could be of great use to policy makers and library/university management in providing quality library services.

1. The result of this study clearly showed that the majority of students need lectures as main kind of information. Off-Campus students faced obstacle regarding lectures that are required for their study and related activities. This suggests that distance students need to be provided online or web based lectures related to their programs, to help them and enable them to fulfill their educational needs.
2. The majority of students' data showed that the library as well as the internet was an important information channel they mostly used for meeting their needed information. Both information channels are easily accessible for regular students but distance students may not be able to access these channels. It is suggested that IT centers/internet cafes should be provided for distance students in each district.
3. The study result clearly showed that most of the students go to the library personally. It may be due to lack of library remote services. Therefore, it is imperative to start some online chat services, following the format of commercial companies call centers, through the library website or other social networks.
4. Remote online access to HEC digital library databases related to the study program should be provided to all students.
5. Modern, well established libraries and high quality library services successfully support the education programs. It is recommended that well established and comprehensive libraries should be providing in each and every city at a central point.

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PERCEPTIONS AND PREFERENCES FOR ADVISINGS STYLES AMONG ENGINEERING UNDERGRADUATE STUDENTS

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ABSTRACT
This study was designed to investigate the perceptions and preferences of academic advising styles (prescriptive or developmental) reported by undergraduate engineering students. The significance for this research is that there are no studies that have examined the current incidence and preference of advising styles for engineering undergraduate students. The high attrition rate in the engineering colleges nationally makes it critical to investigate what can be done to increase retention. We do not have evidence of female students' preferences for and perceptions of academic advising, nor do we know the preferences and perceptions of males, a more traditional group of students in engineering. The lack of awareness of academic advising preferences could be a major component in the high attrition of students in the engineering major. Moreover, increased awareness and understanding for advisors, faculty administrators and even students will befall, and in turn strengthen retention. This study will investigate the expectations and perceptions of engineering students on the Prescriptive-Developmental Advising Model. The Academic Advising Inventory instrument was completed via the Internet by 373 students. This study specifically examined the comparison between gender, classification and grade point average (GPA). Results indicated no significant gender difference of reported advising style. Both genders prefer developmental advising, but female engineering student's preference is significantly stronger. Engineering students with lower GPA's report receiving prescriptive advising, while students with a higher GPA reported receiving a developmental style of advising. The results indicated the importance to facilitate an increase in *Developmental Advising* for engineering students. Both students and faculty could benefit by providing workshops to enhance the communication between the groups. A Developmental Advising workshop for engineering faculty advisors should encourage the advisors to: 1) devise an effective plan when advising incoming freshman and students with low GPAs; and 2) understand the difficulties that women face in entering the engineering field as these difficulties may result in different needs than their male counterparts. Workshops for engineering students should include: 1) a seminar for all incoming freshman students to learn key skills to successfully navigate in the engineering college; 2) a workshop to help students (particularly women) initiate contact when communicating with faculty members who might intimidate them; and 3) skills to clarify their intellectual and personal needs. This research goal is to add a new perspective to the understanding of the advising process and may have implications for academic achievement and retention of students in engineering programs.

INTRODUCTION

Academic Advising is an important tool in the educational experience for many college students (Vianden & Barlow, 2015; Cook 2009). It has been a great vehicle for promoting intellectual and social development. Academic advising has also impacted student satisfaction, retention and graduation rates (Drake, 2011; Applyby, 2001; Crockett, 1985; Crookston, 2009, 1972; Ender, Winston, & Miller, 1984; Gordon, Habley, & Associates, 2000; Kuh, 1997; Winston, 1996). Many studies have shed light on the importance of quality academic advising at the university undergraduate level, but few have specifically looked at academic advising in engineering departments. In comparison to other programs, the attrition rate for engineering degree programs nationally is unparalleled, with statistics representing over 50 percent (Geisnger & Raj Raman, 2013 & Morning & Fleming, 1994). Levin and Wyckoff (1995) attribute much of the attrition to inappropriate educational planning through academic advising. "One of the difficulties of studying academic advising is the diversity of advising programs and attitudes" (Crockett & Crawford, 1989, p. 154). The goal of this study is to explore the advising styles as they are currently perceived and preferred by undergraduate engineering students at a mid-sized comprehensive university in the southeast.

Academic advising is an important part of a student's education. "Academic advising is a systematic process, based on student-advisor relationships, conceived to aid students in achieving academic goals, career goals, and personal goals" (Ender, Winston, & Miller, 1984, p.19; Aiken-Wisniewski, 2015). It impacts the lives of the students' as well as the institutions welfare (Baker & Griffin 2010; & Crockett, 1985). This mid-sized university defines ***Academic Advising*** as a collaborative process between student and advisor leading to the exchange of information that encourages the individual student to make responsible academic and career decisions. This

definition aligns with one of the two major theoretical perspectives that dominate scholarly inquires related to the different styles of advising.

Crookston (2009) reported that there are two advising styles- prescriptive advising and developmental advising. Prescriptive advising is primarily focused on formal academic matters and developmental advising reflects a concern for the student's total education (Harris, 2018, Crookston, 2009, 1972; Winston & Sandor, 1984b). ***Prescriptive advising*** is defined as a program-focused activity in which the advisor dispenses information to the student and monitors progress (Crookston, 2009). Prescriptive advising is a more traditional advising process, in which the advisor focuses on the requirements of academic performance and not on the development of students. The role of an advisor offering prescriptive advising is primarily that of a provider of information and de-emphasizes the role of the student in the advisement process (Harris, 2018, Appleby, 2001; Crookston, 2009, 1972; Winston & Sandor, 1984b). Lowenstein (1999) characterizes prescriptive advising as: (a) hierarchical relationship; (b) one-directional flow of information and ideas; and (c) the student as a passive recipient.

Developmental advising expands the role of the advisor and is considered the opposite of prescriptive advising (Grites, 2013, Crookston, 2009, 1972; Winston & Sandor, 1984b). Unlike the advisor role in prescriptive advising, the developmental advisor enters into collaboration with the advisee. The goal of developmental advising is to help students clarify interests, skills, attitudes, and values as they relate to the college experience and career goals (Harris, 2018, Appleby, 2001; Crookston, **2009,** 1972; Lowenstein, 1999; Winston & Sandor, 1984b). Lowenstein (1999) characterizes developmental advising as: (a) dialogue; (b) two-way flow of ideas and information (while recognizing that the advisor may have specialized knowledge that the student does not); (c) question-and-answer approach and (d) the student as an active participant. Ender et al., (1984) suggested that:

> Developmental academic advising is defined as a systematic process based on a close student-advisor relationship intended to aid students in achieving educational, career, and personal goals through the utilization of the full range of institutional and community resources. (p.19)

Developmental advising is believed to best serve the needs of American college students (Grites, 2013, Harris, 2018, Crockett & Crawford, 1989; Crookston, 2009, 1972; Herndon et al., 1996; Winston & Sandor, 1984b). Several researchers (Crockett & Crawford, 1989; Herndon, 1993; Herndon, Kaiser & Creamer, 1996; Winston & Sandor 1984a) have concluded that students want to retain their autonomy and decision-making freedom with a strong support system from their advisor, thus indicating that they prefer developmental advising. Developmental advising enhances students' total development by addressing their intellectual and personal needs.

Specifically focusing on engineering students, Levin and Wyckoff (1995) found that academic advising focused only on course requirements for specific engineering majors and paid little attention to individual interest, ability, or appropriateness (p.15). In a qualitative study, Good, Haplin and Haplin (2002) found that many engineering students wanted their advisors to make more of an active effort when interacting with them. Studies have found that faculty interaction outside the classroom was a significant predictor of grade point average for students (Littleton, 2001; Moore, 2000). Academic advisors provide a critical service for the development of students in an academic setting. It is important for advisors to understand students' needs and preferences to interact and communicate effectively (Harris, 2018).

Models of academic advising are countless with different models being used at universities ranging from Ivy League to small private universities. However, engineering is still a profession that male dominated profession with the Congressional Joint Economic Committee reporting that currently less than 15 percent of engineers are current women. The statics show reflect a gap that can be address at the colligate level through program retention. Retention of women in engineering programs is directly associated with effective advising. Employment of the advising model that is suited toward women will give strong support while promoting autonomy in decision making with the engineering program (Auguste, et al., 2018; Vianden, et al., 2015, Crookston, 2009; Crockett & Crawford, 1989).

Though grades are important, an academic advising model that uses a more holistic approach is more one that has proven suitable for women versus men. While prescriptive advising models focuses on advising as primarily that of a provider of information and de-emphasizes the role of the student in the advisement process (Appleby, 2001) which works for most universities whose population is predominantly independent; it may not work in all the department of those universities. Therefore, university academic programs must be willing to acknowledge the research done in other in academic advising avenues and the findings to suggest which academic advising models are successful with which population in certain university programs. Use of such

research will reduce time and effort in the incorrect academic advising models and increase the effort and retention of student with the use of the correction model in the necessary programs such as engineering. **(**He, 2017 & Aiken-Wisniewski, et al., 2015).

PURPOSE OF THE STUDY

The significance for this research is that there are no studies that have examined the current preference of advising styles for female students in engineering and subsequently how this compares to their male counterparts. Evidence presented has shown that female students experience academic difficulty in engineering and attain the baccalaureate degree at rates much lower than males. However, we do not have evidence of female students' preferences for and perceptions of academic advising, nor do we know the preferences and perceptions of males, a more traditional group of students in the engineering major. The purpose of this study was to examine the perceptions and preferences of academic advising reported by undergraduate engineering students. Specifically, the research examined the current perceptions and desired preferences for prescriptive or developmental advising. This study specifically examined the comparison between gender, classification and grade point average (GPA). This research has the potential to add a new perspective to the understanding of the advising process and has the implication for academic achievement and retention of students in engineering programs. In additional to engineering advisors benefiting from this study, others advantages includes enhancing awareness and understanding of advising preferences could result in increasing: (a) current advising services; (b) student willingness to interact with advisors; (c) student satisfaction; (d) retention; (e) graduation rates; and (f) future employment for all students in engineering.

Participants

The population for this study was undergraduate students ranging from freshmen to seniors enrolled in an engineering college. A total of 3,885 undergraduate engineering students were alerted via E-mail to the availability of an Internet survey. Four hundred and two (10.3%) undergraduate engineering students replied and participated in the study on-line. Of these, 29 were disqualified, either because they failed to complete the instrument on-line correctly or they submitted a duplicate entry. Of the remaining 373 usable entries, a total of 265 (71%) males participated in the study along with 108 (29%) females. Thirty-four percent of the participants were seniors, 28% were juniors, 24% were sophomores, and 14% were freshmen.

Instrument

The *Academic Advising Inventory* (AAI) was developed by Winston and Sandor (1984a) to measure the two advising styles- *prescriptive* and *developmental* advising was used in this study. *Prescriptive* advising is primarily focused on formal academic matters, and developmental advising reflects a concern for the student's total education (Crookston, 2009). The AAI is a three-part instrument that measures the level of prescriptive or developmental advising perceived by students, and the level of advising preferred. The AAI was found to have a high construct validity and reliability. The questions were derived from an eight-member panel of advising experts nationally. Reliability and validity of test items are based on studies published in the test manual for the AAI by Winston and Sandor (1984a). The alpha coefficient for the Developmental-Prescriptive Advising scale was found to be .78, as measured using Cronbach's alpha.

Part I, the Developmental-Prescriptive Advising (DPA), (items 1-14) consists of 14 pairs of statements. This section is used to measure the nature of advising that the students perceive they are experiencing with their academic advisor. Paired statements exemplifying advisory topics and concerns are presented in this section. Each pair represents two ends of a continuum between the two contrasting advising styles (Winston & Sander, 1984a). Subjects were asked to indicate where, on an eight-point continuum anchored by the two statements, they would characterize the academic advising they have received. Low scores (14 to 56) indicate that *prescriptive* advising is prevalent; while high scores (57 to 114) indicate *developmental* advising is evident between the student/advisor relationship.

Part II, the Developmental-Prescriptive Advising or the "Ideal Advisor" section is another 14-item pair of statements in which the student is asked how they view their ideal academic advisor. One of the paired statements represents developmental advising and the other prescriptive. This section measures the students' preference for a particular advising style. A score 14 to 56 implies a preference for *prescriptive* advising, while a score between 57 to 114 indicates a preference for *developmental* advising. Part III of the AAI contains demographic information: (a) gender, (b) classification, and (c) GPA.

Data will be presented of the advising style received and advising style preferred (prescriptive or developmental). The categories of comparisons are centered on gender, classification and GPA. An analysis of variance (ANOVA) and *t*-test were conducted to analyze the data. The AAI evaluated the type of advising students perceived they are currently receiving and what type of advising is preferred. Scores below 57

indicated that the engineering student reported or preferred prescriptive advising, and scores 57 and greater indicate that the student reported or preferred developmental advising (Winston & Sandor, 1984a).

FINDINGS

Gender

Looking at the type of academic advising that students reported receiving, results revealed that engineering students in this survey scored a group mean of 62.21, indicating that the students who participated in this study believe they are receiving a low developmental style of advising. When categorizing the groups by gender, the males scored a group mean of 61.05 and the females scored a higher group mean of 65.04. Both genders as a group reported receiving a developmental style of advising. The frequency results revealed that many male engineering students (60%) reported receiving a developmental style of advising. The frequency table also revealed that the majority of the female engineering students (59%) reported receiving a developmental style of advising as well. Results of the *t*-test, t(203.57, N=373) =-1.71, p=.088, indicated that there is no significant difference between the two groups (male, female) reported of advising style received. See Table 1.

When asked what type of advising the engineering students preferred, males and females scored a mean 89.10 and 94.35 (developmental advising) respectively. The type of advising style desired by both groups of participants rendered a score higher than what the students perceived they received from their faculty. Although both genders prefer developmental advising, a statistical analysis confirmed that female engineering students had a significantly stronger desire for a more developmental advising approach than male engineering students do. The *t*-test revealed, *t*(245.59, N=373)=-3.24, p=.001 that females scored significantly higher than males. See Table 1.

Table 1 *Gender Means of Advising Style Received and Preferred*

Gender	Male (N=265)		Female (N=108)	Total = 373
	Received	Preferred	Received	Preferred
Mean	61.05	89.10	65.04	94.35
SD	20.57	15.01	20.02	12.04
Median	62.00	91.00	64.00	96.00
% Pres	40.00	3.00	41.00	---
% Dev	60.00	97.00	59.00	100.00

Note. Results of *t*-test, t(203.57, N=373) =-1.71, p=.088, indicated that there is no significant difference between the two groups, both gender groups are receiving a developmental style of advising. The *t*-test also revealed, *t*(245.59, N=373)=-3.24, p=.001 that females scored significantly higher than males for a higher preference of developmental advising. Prescriptive advising is a score between 14 - 56. Developmental advising is a score between 57 - 114.

Classification

Analysis of Variance (ANOVA) was used to test whether there were any differences in advising style reported and preferred by classification (freshman, sophomore, junior and senior). Results showed that there were no differences in advising received F(506) =1.20, p=.306 or advising preferred F(270) =1.30, p=.272 for the different class standings (freshman to senior status).

Results from the AAI revealed that all classification groups reported receiving a developmental style of advising: Freshmen (57.84), Sophomore (61.13), Junior (63.71), and Senior (63.47). The freshman class reported receiving the lowest level of developmental advising, which could be characterized as a borderline *prescriptive* style of advising. In regard to the type of advising style preferred, all classifications preferred a developmental style: Freshmen (91.94), Sophomore (92.22), Junior (90.95), and Senior (88.68). All classifications report receiving and prefer a developmental style of advising. Refer to Table 2 for an illustration.

Table 2 *Classification Means of Advising Styles Received and Preferred*

Classification	Received	Preferred		N
Freshman	57.84	91.94		51
Sophomore	61.13	92.22		90
Junior	63.71	90.95		105
Senior	63.47	88.68		127
Mean Average	62.21	90.62	Total 373	

Note. Prescriptive advising is a score between 14 - 56. Developmental advising is a score between 57 - 114.

Grade Point Average

Students were categorized by 1, 2, 3, and 4 where 1 = GPA between 1.0-1.9, 2 = GPA between 2.0-2.9, 3 = GPA between 3.0-3.9, and 4 = 4.0-higher. ANOVA was conducted to analyze whether the various levels of GPA were different in the advising reported and preferred. Results of the ANOVA indicated that the categories of GPA are statistically different F(9750) =26.46, p=.000. Students with a GPA between 1.0-1.9 reported a (41.66) prescriptive advising style and all other categories reported receiving developmental advising. Students with GPA ranging between 2.0-2.9 and 3.0-3.9 reported receiving a mean score of 60.04 and 68.78 respectively. Students with the GPA range of 3.0-3.9 reported receiving the highest developmental mean score. Please note that one student had a GPA of 4.0, for statistical reason that student was categorized in the 3.0 group. All GPA categories preferred a developmental advising style with a total group mean score of 90.62. Results are displayed in Table 3.

Table 3 *GPA Means of Advising Styles Received and Preferred*

GPA	Received	Preferred		N
1.0-1.9	41.66	92.90		29
2.0-2.9	60.04	90.08		187
3.0-3.9	68.78	90.80		156
4.0	37.00	97.00		1
Mean Average	62.21	90.62	Total 373	

Note. There was a significant difference in the style of academic advising received for students in the 1.0-1.9 group. Prescriptive advising is a score between 14 - 56. Developmental advising is a score between 57 - 114.

DISCUSSIONS

The focus of this study was to examine the perceptions and preferences of academic advising for undergraduate students in the engineering college. Specifically, the study examined the reported and desired preferences for prescriptive or developmental advising by gender, classification and GPA. Overall, students reported receiving a developmental approach to advising (62 on a 14-114 scale). However, students reported receiving a lower level of developmental advising than they preferred (91 on a 14-114 scale). It is important to note that a large portion of the male (40%) and female (41%) engineering students reported that they were receiving a prescriptive style of advising yet preferred a developmental style. These figures should be a forewarning to the engineering department. This data supports the findings of Good, Haplin and Haplin (2002), revealing that a large portion of students would like their advisors to make more of an active effort when interacting with them.

This study corroborated the findings of Crockett and Crawford (1989), Herndon (1993), Herndon et al. (1996) and Winston and Sandor (1984 a & b) in the fact that all students prefer a developmental style of advising over prescriptive. This study adds to the literature by expanding study participants to include engineering students. The data supported the literature, validating that both genders of students prefer an advisor who promotes a collaborative and caring relationship. A developmental advisor assumes that each student is unique; with a particular level of preparedness academically, socially and emotionally (Crookston, 2009; Ender et al., 1984; Grites & Gordon, 2000; Winston & Sandor, 1984a). Students would like their faculty academic advisor to clarify interests, skills, attitudes, and values as they relate to the college experience and future goals. Developmental advising is preferred more than prescriptive advising because there is a more equal relationship and bi-directional flow of information and ideas. The prescriptive advisor only focuses on the requirements of academic performance and not on the holistic development of students. Prescriptive advising is more of a traditional advising process that has been considered outdated (Appleby, 2001; Grites & Gordon, 2000).

SIGNIFICANCE

Results of this study found that both genders prefer developmental advising. Female engineering students reported a stronger desire for a more developmental approach from their academic advisors than male engineering students did. The undergraduate engineering female students may have a stronger desire because they are in a technical field that is traditionally dominated by men.

The freshman class reported receiving the lowest level of developmental advising, which is borderline prescriptive with a group mean score of 57.84. The freshman and sophomore classes indicated the strongest preference for developmental advising with a group mean score of 92. In a difficult and technical field such as engineering that has a national attrition rate of close to fifty percent (Geisnger & Raj Raman, 2013); a prescriptive style of advising for young underclass engineering students may be a limitation for students making that transition from high school to college.

Other interesting data revealed that the students with the lowest GPA were most likely to report receiving prescriptive advising. Students with a GPA between 1.0-1.9 reported receiving a (41.66) prescriptive advising style, while all other categories reported receiving developmental advising. Several studies have found that faculty contact outside the classroom is a significant predictor of grade point average for students (Littleton, 2001; Moore, 2000). Similarly, results from this study revealed that students in the GPA range of 3.0-3.9 category reported receiving the highest group mean score of 68.78, receiving the developmental style of advising. Alternatively a student receiving prescriptive advising with comparable GPAs may not develop the confidence and academic behaviors required to be successful in an engineering environment. Without knowing which is the predominant factor, the advising style or a lower GPA, if a student did not have a strong start and did not perceive support from the advisor, that student would arguably have more difficulty overcoming the GPA than if support were perceived. Further research is needed to flush which combination of factors would assists students, both general and engineering, to be successful with a complementary developmental or prescriptive advising model.

CONCLUSIONS

The results from this study can shed light on the current advising and preferences of undergraduate engineering students. Not fully meeting academic advising preferences could be a major component in the high attrition of students majoring in engineering. It is evident that it is important for faculty advisors in the engineering college to understand their own advising approach and the diverse needs when interacting with underclass student's gender and students with low GPAs. By studying these populations, we can gain a greater understanding of the needs of all undergraduate students in engineering which can result in faculty advisors developing more effective strategies when interacting with *all* students (Auguste, et. al. 2018; & Aiken-Wisniewski, et. al. 2015).

To facilitate the increase in developmental advising, both students and faculty could be provided workshops to enhance the communication between both groups. A developmental advising workshop for faculty advisors should encourage advisors to: 1) help students clarify interests, skills, and attitudes that will facilitate success for all groups of students as they develop a purpose and direction towards earning an engineering degree; 2) devise an effective plan when advising incoming freshman and students with low GPAs; and 3) understand the difficulties that women face in entering the engineering field as these difficulties may result in different needs than their male counterparts. Workshops for students should include: 1) a seminar for all incoming freshman students to learn key skills to successfully navigate in the engineering college; 2) a workshop to help students (particularly women) initiate contact when communicating with faculty members who might intimidate them; 3) skills to clarify their intellectual and personal needs.

Evidence presented indicated a correlation between advising methods and student performance (Thompson, 2016). Since the AAI is a self-report instrument from the perspective of the student, it would be illuminating to compare student perception to faculty perception of the advising offered. If perceptions differ, (if students perceive a prescriptive style but faculty report delivering a developmental style) a follow-up study could provide tapes of some advising sessions of developmental and prescriptive styles for student and faculty coding to determine gaps between the perceptions. Further research should be conducted to find out why students with low GPAs believe that they are receiving a prescriptive style of advising, whether the faculty are consciously advising them in a different manner, and whether a change in advisor or advising style might impact the GPA. Additional qualitative research can be conducted to focus on the students who have dropped out or transferred from the engineering major. A qualitative study should be conducted to further research why female students have a significantly stronger desire for a more developmental style of advising compared to their male counterparts. Further research should be done to investigate students of different ethnicity to reveal their preference for advising, and the advising they are currently experiencing. This research may help address the needs of students with diverse backgrounds. Minority students have traditionally had difficulties with the transition when entering technical majors such as engineering at Predominately White Institutions (Harris, 2018; Burrell & Trombley, 1983; Good, Haplin & Haplin, 2002; Hrabowski & Maton; 1995; Hrabowski, Maton & Grief, 1998; Hrabowski & Pearson, 1993; Landis, 1991; Moore, 2000; Morning & Fleming, 1994). Hopefully this research will add a new perspective to the understanding of the advising process and have implications for academic achievement and retention of all students in technical fields like engineering.

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THE EVALUATION OF CULTURAL EFFECTS ON THE LEADERSHIP BEHAVIOR OF SCHOOL MANAGERS IN THE TRNC STATE LYCEES

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ABSTRACT

The effects of cultural values on the leadership characteristics of school administrators constitute the main purpose of this research. The universe of the research is the administrators of the state high schools located in the Nicosia, Famagusta, Girne, Iskele, Guzelyurt and Lefke districts of the Turkish Republic of Northern Cyprus. As a sample, all managers were targeted. For this purpose, before the United States and applied in Turkey, 85-point scale is used. In the study, it has been found that the highest leadership value possesses Transformational Leadership. "Self-management" has a significant impact on cultural value, transformational leadership style and proves the relationship between culture and leadership.

Keywords: Leadership in Schools, Cultural Values, Transformational Leadership

FOREWORD

Nowadays, developing technology, increasing population and diversified social and economic relations and complex communication network become more and more difficult to achieve competitive advantage; success from commercial and non-commercial organizations has made it even more complex and difficult. In such an environment, achieving the objectives by using the resources effectively and efficiently makes the management of planning, organizing, execution, and coordination and audit activities in all functions from production to human resources more important.

Management is the process of achieving certain goals in an organization by making decisions, planning, organizing, devising, implementing and controlling all available resources efficiently and effectively (Koparal, 2001, p.3). It is the sum of conscious and regular actions undertaken in cooperation and solidarity in order to achieve the goals drawn (Sabuncuoğlu and Tokol, 2001, p.164). Undoubtedly, the most important decision-making authority in the realization of management activities is the manager. The manager works through others to achieve certain goals (Koçel, 2011, p.62), tries to ensure the loyalty of the customers, gives formal tasks to the employees in order to realize the determined objectives. The quality of management varies according to the management style of the top manager and the managers who have to follow it.

The executive, who takes his power from authority, must carry some personal characteristics in order to be able to realize effective management. One of these personal characteristics is the ability of the organization to affect the behaviors of individuals and clusters, in other words, leadership ability. It is not only managers who direct the organization, affect the members of the organization and create vision; A different concept called) leadership tır has emerged in many studies that have a say in organizational success (Uğur, 2014, p.122). Knowledge and ability elements are emphasized in many definitions, but different personal characteristics appear to be prominent in leadership. However, not every manager can be the leader, and not every leader can be an administrator. However, the fact that a good manager is a good leader at the same time is one of the main factors determining the success of the organization / institution.

In other words, all non-commercial and non-commercial organizations / institutions now need more managers / leaders. In order to show leadership characteristics, it is tried to gain the necessary leadership potential by various methods such as leadership training. Prior to the development of the leadership potential, it is imperative to determine the current situation of the managers, to reveal the deficiencies and tendencies and to design the trainings to be given.

The heads of state high schools in the Turkish Republic of Northern Cyprus are also appointed by law. Therefore, they are not authorized to change the purpose, policies and functions. The school head must have superior characteristics than the natural leader in order to maintain and maintain corporate effectiveness by realizing the institutional goals that he and his employees do not. Intelligence, experience and education are among the necessary qualifications but they are not sufficient. They should also be able to establish a communication and relationship based on friendship with their subordinates. Management knowledge and the ability to manage conflicts must have the ability to make decisions quickly, to see and solve problems in the unlikely circumstances. It is more motivated than subordinates in the realization of institutional / organizational goals. They should recognize the qualifications of the subordinates use each as sufficient and evaluate their powers at the highest level. They must be interested in change, they must have vision, they must be determined, hardworking and trust in themselves, they must have conceptual thinking, creativity, finesse and diplomatism, impressive speech and persuasion, organization and social skills.

With this study, school administrators in state high schools will be exposed to multidimensional leadership and cultural values analysis and by evaluating their current situation, it will have the opportunity to demonstrate whether or not the impact of our cultural values on the leadership properties. For this reason, the study will be the basis for designing leadership trainings.

LEADERSHIP AND SCHOOL MANAGEMENT

The excess of research on leadership leads to the definition of a different leadership by almost every researcher. (Basaran, 1992, p.53). If we act from a number of common characteristics of these definitions, the leader is to motivate and manage the employees in order to ensure the success of the organization / organization; honesty, trust, openness and respect for employees can be defined as management. (Kıngır and Şahin, 2005, s.409). Because of the need for orientation and management of individuals, leadership has an important place in organizational and social life (Palmer and Hyman, 1993, p.103).

They lead people as the leader; followers follow them willingly and willingly. According to this definition, the leader is the sum of the knowledge and skills of gathering a group of people around certain goals and mobilizing them in order to realize these goals (Tağraf and Çalman, 2009, p.136 and Korkut, 1992, p.159). They believe and count the leader. The leader is the one who initiates organizational goals, new structures and processes, and can convince and influence the followers (Memişoğlu, 2015, p179). According to Şişman (2012), leadership is the power to influence and refer others to certain goals and goals. According to Paksoy (2002), leadership is an effective activity and view, to guide, to guide and to guide.

Leadership, in contrast to rationality, is a concept that outweighs emotional dimension. Leadership; It refers to influencing other people, giving them enthusiasm and excitement, guiding them, encouraging them and guiding them (Şişman and Turan, 2001). It is a known fact that leadership changes depending on the subjective situation, the work to be done and the followers. In each case, instead of a general leadership that can be mentioned for every job and everyone, a leadership concept which is changed according to the situation, and if it is to be done and the followers, is accepted (Özdemir and Sezgin, 2002, p.268).

The leader influences motivation by using rewards when the desired goal is attained, by supporting it while striving to achieve the goal, by motivating it and by eliminating the obstacles to reaching the goal. The leader leads to reach the desired goal. The leader's behavior enriches the motivation of employees and increases job satisfaction.

The leader was defined as the one who perceived the common ideas and desires felt by the group members but not clarified as an acceptable goal and activated the potential members of the group members around this

purpose (Eren, 2010). Leadership is the art of influence. Influence is the ability of the leader and the followers to develop a communication system that shares the same objectives with similar expectations. In this context, communication requires understanding and interpreting the organizational culture as a system of value, belief, norm and symbols shared by the members of the organization.

LEADERSHIP BEHAVIORS FROM SCHOOL ADMINISTRATORS

Teaching leaders define the school mission; develop a positive learning environment; continuously monitor the teaching process and provide appropriate feedback; to manage the teaching curriculum and the educational process; they undertake tasks such as evaluating educational programs (Özdemir and Sezgin, 2002, p.67). In order to fulfill these tasks, they must be focused on learning. The aim is to provide students with the knowledge and skills they need in their lives. This can be achieved not by random actions, but by activities with predetermined, scientific principles. The achievement of the aims of the curriculum depends largely on the fulfillment of the roles expected by the school administrators (Gülbahar, 2014, p.84).

A lot of research has been done in order to define instructional leadership and determine instructional leadership behaviors. In his study, Yılmaz (2010) stated that there are significant relationships between school principals' instructional leadership and effective schools. The most effective factor for effective schooling is the school administrator. According to Çelik, instructional leadership is the work of bringing the working environment of the school to a satisfactory and productive way in order to raise good students and provide desirable learning conditions for teachers (Çelik, 2000a).

School administrators can influence school climate and environmental factors as well as improve teachers 'motivation and capacities and improve students' performance within the classroom. It requires school administrators to act as instructional leaders in view of the impact of school administrators on student achievement and increased social expectations. Five main tasks of school leaders; it has been defined as direct assistance to teachers, development as a group, personal development of employees, development of curricula and action research (Ada and Gümüş, 2012, p.466). In addition, teaching leadership requires that school principals spend a large part of their working hours in classrooms and corridors, not in their offices, to make observations to improve the quality of teaching activities (Çelik, 2000; Özdemir & Sezgin, 2002).

As instructional leaders, school heads are responsible for school-related factors, as well as environmental factors that affect education and training. It is clear that the impact of the school on student achievement cannot be denied. However, many studies by the environment and family factors are also influential on student achievement as much as the school. Particularly, the participation of the family in the education process is very decisive in many different subjects such as students' exam results, attendance to school and behaviors at school. Teaching leaders should be able to use family and other environmental resources in cooperation with parents and the school environment to increase the success of the school (Şişman, 2002).

The school administrator should be able to make the necessary arrangements in order to ensure the successful training of the student, to direct the colleagues he works with, to prevent the development of negative behaviors and other modes of action. In this context, the school administrator should direct the education institution in an efficient and productive manner, aware of the contemporary developments and developments in the environment, teaching processes and education. Good family and environment relations, the cooperation of parents with teachers, the importance of environmental culture, the participation of parents in educational planning, the safety of the school environment are effective school features that are coded under the theme of family and environment of effective schools (Çubukçu and Girmen, 2006)

A good teaching leader has a vision, transforms vision into behavior, creates a supportive environment, knows how things work at school, and mobilizes knowledge. Therefore, it leads the transformation. They clearly determine their goals and expectations related to education, and they ensure that these goals and expectations are delivered to teachers and other interested parties (Balcı, 2001; Şişman, 2012).

The school head should first make a professional career plan for him and then share with the teachers following the developments and studies on education and training. In addition, they should contribute to the professional

development of teachers; organize activities they can transfer to school and reward successful teachers (Elçiçek, 2016).

It is possible for schools to respond to the changing needs of the society, to ensure change, and to renew policies and practices. As schools are dynamic stones that keep society alive, schools need to be made effective, continuously developed and strengthened so that they can carry out these tasks continuously (Cafoğlu, 1996). In addition to the supporting tasks that continue the school organization in its current form, the school administrator also carries out the tasks that lead the organization forward in its quest to achieve its mission and bring innovation to management practices (Allan, 1999). Efficient accomplishment of this important task can be achieved more easily by the leadership of the school manager.

In summary, the perfect school can be realized not only by teachers' commitment to quality education and training, but also in harmony with a healthy school climate and social culture (Çubukçu and Girmen, 2006). Increasing the effectiveness of schools, creating a healthy school climate, and the continuation of the school administrators at the same time makes it necessary to be the teaching leader. Trust, transparency, responsibility, high morale, friendship and sincerity are indicators of positive climate in schools. Considering that the school climate affects the relations of the school stakeholders, it can be said that the cooperation of the stakeholders, supporting each other, creating an environment of mutual respect and tolerance are important for schools to be effective (Şişman, 2012).

Teaching managers must also have a multi-leadership leadership power, such as institutional and transformative leadership. When it comes, it should follow the developments in the surrounding and other sectors by performing different leadership roles. At the time of transformation and change, the school should set a new target and direction. As an instructional leader, the school head should be an important supporter of educational activities at school.

Training managers are expected to have the power and competence to play a leadership role in the effective use of limited resources allocated to education as well as to realize the desired innovations by immediately sensing the need for change and development in society and school (Kaya, 1993). Adhering to the realization of the school's objectives, the ability to provide and use the necessary resources to achieve the school's goals, to create a positive climate to meet the expectations of teachers, students, parents and society, to take responsibility as a leader who develops direct teaching policy among the strong instructional leadership behaviors (Çelik, 1997, s.40-41).

School administrators should provide teachers with the necessary resources in order to effectively carry out educational activities. It should be an example to the school staff in the use of instructional resources and to use new and different resources.

School administrators should carefully monitor communication between individuals and groups. To do this requires knowledgeable and skillful in areas such as social psychology, group dynamics and group behavior. The effective and efficient management of human and material resources by school administrators depends on the role and expectations of the teachers and other staff to whom it is related and to act accordingly.

School administrators can be an example of school staff by communicating with teachers on educational issues, sharing new teaching methods and techniques, discussing what can be done to make learning more effective, encouraging the use of new teaching strategies, providing different teaching materials, giving importance to learning and teaching in school. .

School administrators need to recognize the characteristics of teachers. They should have the knowledge and skills to improve the performance of teachers as well as to evaluate this performance. There should be performance evaluation strategies appropriate to the objectives and objectives of the school. Teachers should participate in the decisions taken at the school and help and support the school management. Thus, with the participation, there may be an increase in the level of individual performance. Meetings should be held with employees to ensure continuous improvement and improvement. Full and active participation of all employees should be ensured in these meetings.

Although there is no general agreement between the researchers about the leadership behaviors of school administrators, there are similarities in terms of some leadership behaviors and dimensions which are mentioned in the mentioned studies (Şişman, 1997, p.167):

• Creating clear and clear school objectives,

• Ensuring that all members of the school share the aims of the school,

• To determine the vision and mission related to school and education,

• Creating high expectations for education,

• To have critical, analytical thinking skills,

• Motivator. be stimulating and rewarding,

• To create a strong school culture and learning climate,

• To concentrate on the acquisition of basic skills,

• Regularly assess student development,

• To have problem solving and persuasion skills,

• Start and manage change,

• To provide support and participation to the family, environment and society.

To be able to carry out the above mentioned studies effectively, a number of qualifications defined by the words of knowing and doing must be present in the school administrators. These qualities (Özmen, 2002, p.174)

As a result, the school principal should be able to demonstrate the best mastery of every material in his hand. As a organization, the leader of the school, inspiring, well-intentioned, love and respected, we act with the consciousness of the error, trying to find out what caused the errors should be a leader who knows how best to do the job.

CULTURAL VALUES AND LEADERSHIP

Culture is one of the issues that are spoken about too, such as leadership, but cannot be defined clearly. Culture is the common characteristics of societies which are formed as a result of centuries of value accumulation. Everything that man does is part of culture, man is both a creator and creator as a social being. The socio-cultural system is the product of man (Fichter, 2002, p.136). How the human being thinks, hears, he wants and asks about how and what is human existence as cultural elements; how man looks at himself, how he sees his essence; values, how to organize their desires. Human life style, program of existence and what kind of action pattern it adopts is cultural (Özlem, 1996, p.55). Although there are many different definitions of culture in organizational behavior literature, culture; shared, shared by generations; values, beliefs, identities, meaning of important events (House et al., 2004, cited, Sargut and Aktas, 2011).

The effect of culture on management has not been taken into consideration until recently and it has been generally ignored. As a result of the increasing intercultural research in recent years, it has been found out that, besides cultural values, governance behaviors may differ between societies. It has been observed that there are some distinct differences between the existing and ideal manager behaviors observed by various societies depending on the cultures they have and the characteristics that the society expects from the leaders (Pasha, 2000).

Thus, leadership should be considered as a cultural process. Because leadership makes the cultural environment meaningful and the leader adds meaning to the cultural environment (Erçetin, 1998, p.66). Cultural values and

traditions affect the attitudes and behaviors of managers in very different ways (Ercan and Sigri, 2015, p.99). Cultural culture can lead to meaningful changes in the system by replacing this perspective with a new one, as it provides a world view to individuals living in a system. (Simsek, 1997, p.161). During this cultural transformation, changing and transforming the culture and values that dominate the organization, system or community is crucial.

The school administrator, while protecting them with the importance given to cultural values, explains important cultural meanings, develops customs and keeps important values and principles alive in the school environment. Cultural leadership is necessary for the school to fulfill its mission (Çelik, 2000b, p. 49-50).

School administrators gain cultural leadership from the general cultural value system of the school. These values consist of customs, symbols and other cultural networks that connect people. (Erdem, 1996, p. 37). The prerequisite for effective school is a strong school culture. Strong school culture is formed by the unification of all the components of the school, especially the administrators and teachers who are the implementers of the school program around the common values, norms and beliefs (Gökyer, 2011, p.289).

Beliefs are ideas about the way in which the world is adopted by people who adopt a culture (Şişman, 2007, 3). Belief is a concept used by the members of the organization to indicate what they believe in and never believe. A belief in the success of the members of the organization as a result of the study and the achievement of the success achieved has a motivating effect.

Value is used to express the whole of the basic principles or beliefs that are believed to be correct and valid by the majority of the group members and reflect the thoughts, goals and emotions of the group in order to maintain, maintain and develop the group's own unique existence, unity and continuity. The value has somehow settled on the inner world of the manager who has grown up in a certain culture and influences the manager's attitudes and behaviors in a way that he is unaware of (Ercan and Sigri, 2015, p.99). The values formed according to the beliefs that constitute the deepest aspect of culture are the visible aspect of culture. However, the values are abstract elements and are difficult to observe from the outside, but can be perceived in the behaviors. Briefly, values are given importance and preferred in a culture (Şişman, 2007, p.4).

Cultural norms allow the formulation of acceptable leadership behavior structures and, in some cases, be formulated as social rules that allow others to influence their decisions and behaviors (Ercan and Sigri, 2015, p.99). Norms are formed according to values and are non-written rules or standards. Norms define the way individuals should behave. In other words, the concept of norm is what is not to be done by the member who is a part of the individual or the organization who lives in the society; (Şişman, 2007, p.4). In other words, norms are rules and measures of behavior adopted by a significant number of members of the organization, which are developed through joint efforts in accordance with the cultural values of the organization. For this reason, it is necessary to take its strength from cultural values for the validity of the norm (Özdemir, 2006, p.413).

The school administrator should be a representative of the bureaucracy in school, a door keeper and a cultural and moral leader, leading to the creation and development of core values in the school, rather than being the practitioner of the rules. In doing so, instead of imposing a dominant subculture as a common culture in the school, it should lead the creation of a common common culture above all subcultures that surround everyone (Şişman and Turan, 2001, p. 137). When the values, attitudes, beliefs, and opinions that the school manager possesses are accepted by the individuals in the school and continue for a while, they become part of the school culture. (Simsek, 2005, p. 14).

School administrators are influential in the formation of organizational culture. The administrative practices and decisions in the school are based on the basic values and beliefs that the school administrators have adopted in a number of issues. Whether the director is innovative and pro-risk, supporting opinions and suggestions, award penalties, their attitudes at the time of the crisis affect the formation, form and change of school culture. On the other hand, the cultural structure that was created in the school or previously existed will develop and change depending on many variables over time. This is an inevitable fact. What is important is the planned and controlled exchange of culture. In particular, as it is an educational institution, there may be different values,

understandings and different cultural perceptions of staff, managers and teachers and students working in the school. The school administrator can make an important contribution to the enrichment of the school culture by making use of this different cultural structure.

THE AIM AND IMPORTANCE OF RESEARCH

With the modern management approach, school principals have gained leadership role. Indeed, school principals should act as leaders of the group if they are to be effective. The process of change forces us to recognize the limits of our comfort zone and to face the challenges we face. Like school, school principals, who are responsible for directing micro-universe organizations, must ensure that the organization moves with new technologies under ever-changing conditions.

Lipman considers the leader as an agent of change, and the manager as a designated person who is responsible for keeping the organization alive. He argues that the manager should take the lead in this task by adopting the role of change agent (Lipman, 2000). In other words, school administrators should be confident in their decisions. Again, in order to be able to implement the decisions he has taken, he must have strong communication skills and the ability to persuade his superiors such as the Minister and the Undersecretary, as well as his co-workers and colleagues who are working towards the common goal. Of course, change may not always see the desired attention. There may even be reactions to change. In any case, school principals should maintain their own calmness and motivation and achieve emotion control. She should be able to take risks from time to time in her decisions and actions. From time to time, he should be able to share risks and associate his colleagues with those risks. For this, it should be an example to others and also should be able to use the appreciation ability by demonstrating leadership. The leader is the leader who collects the behaviors and features such as motivation, individual support, visionary, energetic and risk taking beyond the daily organizational processes. It is the person who can bring new expansions to the institution by encouraging his / her subordinates in the solution of the problems that can catch new opportunities in a dynamic society structure, rapid change process (Açıkalın, 2000, p.14).

Therefore, after examining some of the leadership characteristics mentioned above, answers will be sought for:

• To determine which leadership style the school administrators have predominantly.

• To reveal the effect of cultural values on this leadership style with the leadership style we will determine predominantly.

This research is important in determining the leadership in characteristics of school administrators in the TRNC education system and the effects of cultural values on these characteristics. In the light of the findings obtained at the end of the research, the contribution of some of our cultural values to the school administrators to develop their leadership can be revealed. The Leadership characteristics of school principals will be updated and thought, discussion and new research opportunities will be created and the importance of our cultural values will be better understood. In this case, the Ministry of National Education will be able to benefit from the in-service training programs of the school administrators and the improvement of existing training programs.

METHOD OF RESEARCH

The universe of the research is the director and director of the school, who work in 19 state high schools and 13 vocational high schools in Nicosia, Famagusta, Girne, Iskele, Guzelyurt and Lefke. The total number of managers and assistant principals working in these schools is 139.

As a sample, all managers in the universe were targeted. The survey was conducted by going to one of the regional high schools, one by one by face and one by a survey. In the course, a sufficient number of questionnaires were left to the executives who were not present at the meeting by means of secretaries. In total, 91 managers and assistant principals received feedback. 48 managers did not return to the questionnaires. Of the

91 completed questionnaires, 3 of them were excluded from the study due to the lack of answers and 3 of them due to lack of answers. 65.5% of the sample was reached.

Multidimensional Leadership and Cultural Values Scale, which was translated into Turkish by Ümit Ercan (2010), was used as a data collection tool. Significant results have been reached about the dimensions and direction of the relationship between culture and leadership.

SPSS 21.0 program was used for the evaluation of the data collected in our study and statistical analysis. Two scales were used in our study: the first is the inc scale of cultural values and the second is the multi-factor leadership scale of Cronbach was evaluated for reliability analysis of the scales. The scale of personal values developed by Schwart for cultural values; For leadership characteristics, Multi-Factor Leadership Scale / 5X (MLQ / 5X) was developed by Bass and Avolio. Correlation and bi-directional multiple regression numerical analysis methods were used to decipher the hypothetical relations between transformative leadership and cultural dimension.

CULTURAL VALUES SCALE

The scale of cultural values consists of 40 questions, which focus on ten individual characteristics. These are power, success, pleasure, stimulation, self-management, universality, benevolence, tradition, compliance with rules and security. Each is examined with the question if you are not between three and six to describe the cultural sub-dimension.

The forty-item cultural values survey, developed by Schwartz, was developed to be answered in six-point likert style. Scale evaluation “It looks like me” (0), “It looks like me“ (1), It looks a little like me “(2), It looks a little like me (3), It doesn't look like me” (4) and It doesn't look like me at all If (5).

All items of the scale are arranged to be scored in the opposite direction. In order to eliminate the effect of reverse coding in the scale evaluation phase, the value uploads to the database were reversed. The personal characteristics of individuals and the tasks and needs they have in society and the dimensions that have been revealed by Schwartz can be listed as follows (Schwartz, 1992):

• Power: The desire to have social status and dignity. It is the establishment of superiority in control and managerial sense over people and resources.

• Achievement: It is the personal achievement of showing personal skills in accordance with social standards.

• Pleasure (Hedonism): The pleasure and affective pleasure of one's own life and personal activities.

Stimulation: Getting excited from life, being open to innovations and challenging life.

• Self Direction: To have independent thinking, to choose their own behaviors, to explore creativity and free will.

• Universalism: Gratitude to universal values is a desire to tolerate tolerance, tolerance and the protection of nature.

• Benevolence: The desire to increase and maintain the welfare of the people around them (helpful, honest, forgiving, loyal, responsible).

• Tradition: Respecting traditions, accepting the beliefs and traditions of the religion and culture it believes in, and being conservative, depending on these values.

• Conformity: Limiting personal movements in accordance with rules, not disturbing or disturbing others, does not oppose social expectations and social norms.

• Security: Security, cohesion and stability of society, relationships and people. Behavior and evaluation is to keep safety in the forefront.

The values listed above are measured by the following questions in the scale of the study which is presented as an example.

Table 1: Cultural Values and Questions

Personal Value Dimensions	Questions Number
Power	2- 17- 39
Achievement	4, 13, 24, 32
Hedonism	10, 26, 37
Stimulation	6, 15, 30
Self-Direction	1, 11, 22, 34
Universalism	3, 8, 19, 23, 29, 40
Benevolence	12, 18, 27, 33
Tradition	9, 20, 25,38
Conformity	7, 16, 28, 36
Security	5, 14, 21, 31, 35

MULTI-FACTORED LEADERSHIP SCALE

Multidimensional leadership scale is composed of 45 questions in five-point Likert style. Accordingly, the subjects were asked to mark (0) Never, (1) Once in a while, (2) Sometimes, (3) Frequently and (4) Always or very often.

In the Multidimensional Leadership Survey, the averages in the subscales representing the transformative (traditional), liberating leadership main dimensions and dimensions were taken into account. Transformation leaders act as role models to their subordinates or followers. Leaders are admired, respected and trusted. Leaders can take risks and do so consciously, not by chance. They give confidence that they will do the right things, and set very high standards in terms of morale and ethics. Therefore, they are charismatic. They act in a way that inspires and motivates their subordinates to perform their work much more effectively. Transforming leaders mobilize their subordinates by creating creative proposition questions, reshaping problems and approaching the old situations with new methods. Creativity is a suggested condition. Followers are encouraged to find new ideas and their ideas are not criticized because they differ from the leaders' ideas. They pay special attention according to the characteristics and conditions of their subordinates. They show individual sensitivity. Leaders create a supportive environment for their subordinates and establish close relationships with them, see their needs, listen to their wishes and try to find solutions for them. The role of the leader is coaching and counseling. The leader is able to create new expansions, such as empowerment, loyalty and devolution.

Traditional-leaders reward and reward the performers' performances according to their qualifications. It can cause the development of original management characteristics with its passive attitudes against the negative characteristics of its subordinates. One of the most important characteristics is that the leader's subordinates must agree on what activities to do and which performance criteria should be rewarded. Exception and management are cases where leaders provide criticism focused on correcting the behavior of subordinates, and provide negative feedback and negative empowerment. Active and passive are made in two ways. The size that is addressed by active management is the correcting of the deviation from the standards or deviations by subordinates as the process continues. With the criticism and evaluation of the subordinates over the performance or output that emerged after the end of the activity, the situation of management with passive exceptions arises.

The releasing leaders display an approach where they do not interact with their subordinates, escapes responsibility, postpone decisions, provide feedback, and are insufficient to satisfy the needs of subordinates and to satisfy their needs. It is a form of interaction that does not interact with the subordinates as a form of leadership in the opposite direction of interactive leadership. In the liberating leadership, the groups are less organized and the effectiveness decreases. The responsibilities of the leader are ignored and inadequate in using authority. (Bass, 1998, s.6-7).

In our study, we tried to evaluate the values of benevolence , self-management,, ”success”, ”pleasure”, “tradition e and“ tradition “from the dimensions of cultural values we have chosen by chance method. Using the led Stepwise regression technique, we observed that a single variable with a significant effect on the dependent variable was found within the different models tested by the regression test.

FINDINGS AND DISCUSSION

The demographic statistics of the respondents are given in the table below. 54.8% of the participants were female and 45.2% were male. While the number of university graduates is 56, PhD graduates are composed of 3 people. 90.5% of the managers are married and 9.5% are single. 60.7% of the participants were older than 50 years and 1.2% were between 20 and 29 years of age.

The scale of cultural values used in our study and multifactor leadership in our study due to different scales applied in Turkey, although the samples were re-reliability analysis.

Table 2: Cultural Values Scale Reliability Analysis Results

GENERAL	**0.91**
POWER	0.31
ACHIEVEMENT	0.76
ENJOYMENT	0.72
STIMULATION	0.48
SELF- MANAGEMENT	0.61
UNIVERSALITY	0.83
BENEVOLENCE	0.78
TRADITIONALISM	0.28
CONFORMITY	0.60
SECURITY	0.64

Table 3: Multi Factor Leadership Scale Reliability Analysis Results

GENERAL	**0.89**
IDEAL EFFECT (PERSONAL FEATURE)	0,58
IDEAL IMPACT (BEHAVIOR)	0.61
INSPIRING MOTIVATION	0.66
INTELLECTUAL STRENGTHENING	0,73
INDIVIDUAL SENSITIVITY AND SUPPORT	0,65
CASE STUDY	0.59
ACTIVE MANAGEMENT WITH EXCEPTIONS	0,75
PASSIVE MANAGEMENT WITH EXCEPTIONS	0,21
FREE LEADING LEADERSHIP	0,60
ADDITIONAL EFFORT	0,71
EFFECTIVENESS	0.75
SATISFACTION	0.79

General Cronbach α values of the scales were above 0.80. Some sub-dimension Cronbach α values were observed to be low but acceptable.

Table 4: Descriptive Statistics of Leadership Dimensions

		TRANSFORMATIONAL LEADERSHIP	TRADITIONAL LEADERSHIP	FREE LEADING LEADERSHIP	LEADERSHIP GAINS
N	Valid	83	83	83	83
	Missing	1	1	1	1
Mean		**31,5301**	**21,0141**	**5,0298**	**30,4630**
Std. Error of Mean		,52448	,52508	,61578	,59636
Median		31,5000	20,8333	2,5000	30,0000
Mode		29,50[a]	20,00	,00	30,00
Std. Deviation		**4,77822**	**4,78368**	**5,64371**	**5,46569**
Variance		22,831	22,884	31,852	29,874
Range		20,50	21,67	27,50	24,44
Minimum		19,50	11,67	,00	15,56
Maximum		40,00	33,33	27,50	40,00

In Table 4, when the arithmetic averages of the leadership dimensions are examined, it is seen that the average value of the transformational leadership sub-dimension is at the highest level (Mean: 31.5), whereas the releasing leadership sub-dimension is the lowest (Mean: 5.02).

Table 5: Descriptive Statistics of Personal Value Dimensions of Culture

	Mean	Std. Deviation	N
POWER	26,4683	7,971969	83
ACHIEVEMENT	19,8810	10,29610	83
ENJOYMENT	17,0238	10,46468	83
STIMULATION	17,4603	9,13412	83
SELF- MANAGEMENT	12,4405	8,14012	83
UNIVERSALITY	7,7976	7,48117	83
BENEVOLENCE	11,4286	8,88587	83
TRADITIONALISM	21,3095	7,48971	83
CONFORMITY	12,3214	8,08265	83
SECURITY	11,6905	7,89384	83

Table 5 shows the collective evaluation of the personal value dimensions of culture. While the power from the personal value sub-dimensions of culture has the highest mean value, the universality has the lowest value.

	Mean	Std. Deviation	N
TRANSFORMATIONAL LEADERSHIP	63,0602	9,55644	83
BENEVOLENCE	11,4458	8,93848	83
SELF- MANAGEMENT	12,4096	8,18466	83
ACHIEVEMENT	19,9699	10,32619	83
ENJOYMENT	17,1084	10,49934	83
TRADITIONALISM	21,3253	7,53384	83

Table 6: Descriptive Statistics

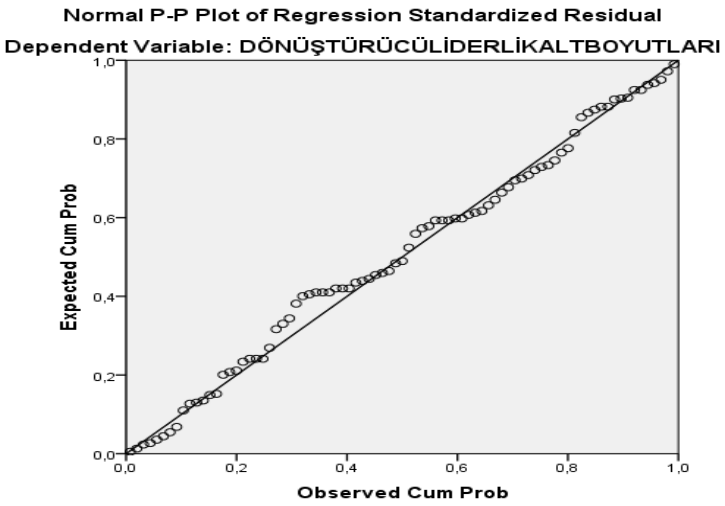
While the traditional sub-dimension of the cultural value dimensions is Mean (21,3253) and the lowest standard deviation (7,53384), it has the lowest Mean (11,4458) value of benevolence sub-dimension.

Correlation and bi-directional multiple regression numerical analysis techniques were used to decipher the assumed relationships between transducer leadership and cultural dimension. After the analysis, the correlation table showed that the self-management variable was positively correlated with the variables of helpfulness, success, pleasure and traditionalistic but negatively correlated with the transformative leadership feature.

When the correlation table is analyzed in detail, it is observed that the variables of helpfulness, self-management, success, pleasure and traditionalistic are always positively correlated with each other while all these variables draw a negative relationship with transformative leadership dimension.

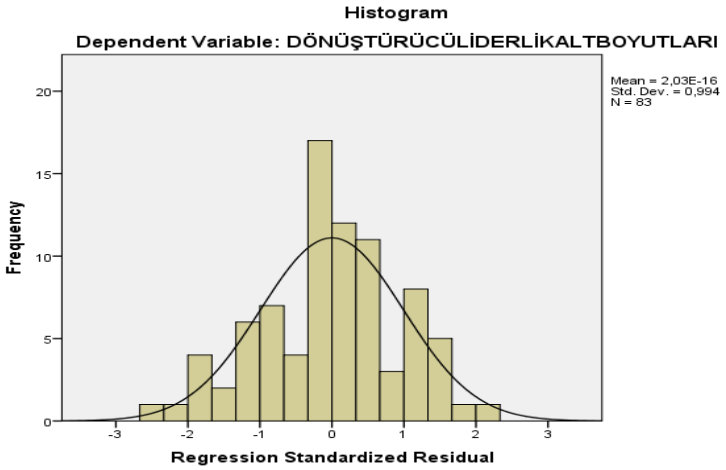
Another important point to be taken into consideration is that all other relationship weaves except the relationship between traditionalism and transformative leadership and traditionalism and self-management were significant at 0.05 alpha level. Correlation does not give us any information about the direction of the relationship when we say that this meaningful relationship exists. Therefore, by considering the hypothesis of our study, we defined the variables of helpfulness, self-management, success, pleasure and traditionalistic independent variables, and transformative leadership variable as dependent variables. Before performing the regression test, we tested the assumption that the relationships between the variables were linear and observed that these variables were in linear relationship.(Graph 1)

Graph 1: Linear Relationship Between Dependent Variable and Arguments



Another assumption was the assumption of normal distribution. When we test this assumption, we see that the dependent variable is normally distributed in terms of the variances of the independent variables, as standard deviation and mean. (Graph 2)

Graph 2: Normal Distribution Graph of Variables of Dependent Variables



The stepwise regression technique was taken into account to determine the degree of self-management, helpfulness, success, traditionalistic variables which are treated as independent variables and the variable of transformative leadership variable which are dependent variables. . When the equation was established and analyzed, it was observed that there was a single variable that showed a significant effect on the dependent variable within the different models tested by the regression. When we take self-management as an independent variable, it is found that it predicts the transformative leadership attribute dependent variable. The predictive power (R = .38%) was observed while the explained variance R^2 =%. 15 was observed.

Table 7: Two-Way Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,381[a]	,145	,135	8,88946	1,952

a. Predictors: (Constant), SELF MANAGMENT
b. Dependent Variable: TRANSFORMATIONAL LEADERSHIP

Regression analysis was significant at .05 alpha level. P = 0.000 <0.05 was found according to F test result at 95% confidence level.

Table 8: ANOVAs Test

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1087,882	1	1087,882	13,767	,000[b]
	Residual	6400,817	81	79,022		
	Total	7488,699	82			

a. Dependent Variable: TRANSFORMATIONAL LEADERSHIP
b. Predictors: (Constant), SELF MANAGMENT

CONCLUSION AND DISCUSSION

In the study, when the leadership tendencies between the directors and deputy principals in the state high schools of the Turkish Republic of Northern Cyprus are examined, it is determined that the leadership has the highest arithmetic average. Only the leadership style and cultural values were analyzed in order to limit our work. When the equation was established and the analysis was run, it was investigated whether cultural values had significant effects on thought leadership as dependent variable. The effects of self-management ",“ benevolent ",” success

“,” pleasure and “tradition management variables on the transformative leadership which are the dependent variables are evaluated from the cultural sub-dimensions which are treated as independent variables in the regression equation. As a result of the study, it was revealed that self-management “predicted Transducer Leadership. The finding that cultural values are effective on leadership is in parallel with the study of Semiha Şahin in İzmir (Şahin, 2004).

With this result, the interaction of different cultural values and cultural differences can be effective in determining new strategies that can be used in management and leadership. In other words, we can say that the development of cultural values and effective management and leadership training can be combined and the shortcomings can be eliminated according to the needs of the era.

The fact that the leaders of the future understand the ever-increasing uncertainties within the social dynamics, and the self-awareness and vision development are of great importance in the new managerial functions. In this context, it should be ensured that the managers of the school manage their programs by including their cultural dimension, and the leadership of the managers should be trained in cultural leadership, cultural intelligence and similar issues.

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WHY USE TECHNOLOGY IN THE SCIENCE CLASSROOMS?

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ABSTRACT
With access to technology in the classroom, use of technology has become essential in the public schools of the United States. Even with the availability of technology in the classroom, many times, its use is in the teacher-centered approach. With the view to understand the lived experience of the science teachers and their technology use in the classrooms, this study took its initiative to analyze and document the lived experience of middle-school science teachers' technology use in the classroom. Observations and interviews with the teachers provided evidence for this study. The data obtained were analyzed based on the constructivist theoretical framework to construct knowledge and draw conclusion. The findings indicate various uses of technology in science classroom to engage students in learning. In conclusion, teachers, students and technology are three sides of a triangle where technology is a medium that bridges teacher's responsibility of providing content knowledge to the students who are familiar with the technology.

INTRODUCTION

The international assessment such as Trends in International Mathematics and Science Study (TIMSS) and Program for International Science Assessment (PISA) compares science education of students from various countries. The mean score of US students in PISA in the year 2015 is 496 which is below average when the average was 493 (OECD, 2016). This indicates a problem in science education in the United States.

Technology is available for teachers as well as students in the classroom (US DOE, 2010). With the assumption that technology brings change in teaching and learning (Bang & Luft, 2013), classroom are filled with technology (Earle, 2002; Waight, 2014). Furthermore, to improve students' science learning, benchmarks for Scientific Literacy (AAAS, 1993), the National Science Education Standards (NRC, 1996), and Next Generation Science Standard (NGSS, 2013) all referred to technology as a medium to improve science teaching and learning.

However, the use of technology in the classroom can be a problem when teachers use the latest technology in teacher-centered approach. Becker (2000) mentioned two types of technology use in the classroom. The first one is teacher-centered, which does not involve students in higher-order thinking and is considered low-level technology use and the second is student-centered which focuses on students technology use for computational, analytical, and critical thinking. Use of technology in science classroom for high-level use is still low (Zhao, Pugh, Sheldon, & Byers, 2002) which suggests a problem in technology use in science classroom.

Besides above mentioned problem, education has become a big consumer of technology, a marketplace (Roberson, 2003). These days, classrooms have the latest technology such as laptops, iPads to facilitate students' learning. The aim of education is to enrich students in their interest and to "make them critical thinkers" (Rajbanshi, 2017). However, these days, education is influenced by standards, and learning is assessment based, which indicates that students need to be computer literate and be able to operate computers as the standardized test are conducted in either computers, laptops or iPads. Furthermore, teachers are content expert but are in stage of adopting technology or exploring technology, which makes teachers use technology in the traditional way without engaging students in actively participating and self-directed exploration which indicates problem with technology use in science classroom.

DEFINITION OF TECHNOLOGY

For this study, technologies are digital devices that are used in the classroom as a learning tool and for knowledge construction. This definition is adopted from Inan and Lowther (2010) and Haley (1998). Inan and Lowther (2010) used technology for instructional preparation, for instruction delivery, and a learning tool. Furthermore, Haley (1998) regarded technology as "tool or medium that helps people accomplish task" (p. 30). Therefore, for this study, the focus of technology are laptops, desktops, iPads, iPhones with internet access, and digital camera that are frequently used in the science classroom as a learning tool and knowledge construction tool.

RESEARCH QUESTIONS

Despite the huge investment in technology to enrich teaching and learning, its use in the classroom is limited. The purpose of this study is to document the middle-school science teachers' technology use in the science classroom and its effect on science teaching. Based on the purpose of this study, research questions were formed that guided the study. The research questions are as follows

- How are science teachers utilizing technology in the middle school science classrooms located in Southern New Mexico?
- What are the effects of using technology in middle-school science teacher's pedagogy?

THEORETICAL FRAMEWORK

Constructivism is the theoretical framework that provides direction to this study, which is both "a theory of learning and a theory of teaching" (Richardson, 2003, p. 1629). Constructivist approach to teaching and learning depends on the developmental stages of the children (Piaget, 1969, 1970), their interaction with the environment and with the peers (Vygotsky, 1978). Knowledge construction depends on "different approaches such as inquiry-based learning, experiential learning, hands-on learning, project-based learning, technology-based learning, communication, discussion, and observation" Rajbanshi (2017, p. 12). In this study, teachers used different pedagogies as well as different technologies as an instruction delivery tool, learning tool, and knowledge construction tool, which are mentioned throughout the paper.

RESEARCH METHODS

This study was conducted in public schools located in southern New Mexico, on the US-Mexico border. The focus of this study was on middle-school science teachers who were teaching seventh grade life science in public schools. Five participants were chosen for this study who were referred as regular attendees of technology-based professional development and technology users in biology classroom. The participants of the study also verified that they use technology regularly in their classroom. All the participants of this study had a bachelor's degree and two of them had a master's degree and one was a bilingual science teacher. All the teachers had more than fifteen years of teaching experience except for the bilingual teacher who was in his fourth year of teaching.

This is a phenomenological qualitative study that focused on the phenomenon or the lived experience of the participants in a population (Marshall & Rossmann, 2006; Creswell, 2007). The phenomenon under study is the teachers' technology use in science classroom. Sampling is done "with some purpose in mind" (Lincoln & Guba, 1985, p. 199) and the purpose of this research is to study the technology use of science teachers in the classroom. Thus, participants who used technology in the science classroom were selected as participants.

DATA COLLECTION

To understand the purpose of using technology in the science classroom, different methods of data collection such as observation and interviews were used to construct knowledge and make meaning of science teachers' experience focusing on technology use in the classrooms. In addition, multiple method of data collection provided multiple views on the gathered data giving it a broader and better result (Fontana & Frey, 1994). Furthermore, different data collection methods validated the gathered data through triangulation, which is a "process of using multiple perceptions to clarify meaning verifying the repeatability of an observation or interpretation" (Stake, 1998, p. 97).

Observations were conducted for a month and a half at the end of the academic year. A general observation protocol and a TUSI (technology Use in Science Instruction) observation protocol (Campbell & Abd-Hamid (2013) were used to note the pattern of technology use in the science classroom. After observations were done teachers were interviewed. After each observation and interview, teachers' classroom practices were linked with the tenets of constructivism, which helped during data analysis process, and reflect on the process of making meaning and develop the themes. For ethical consideration, all the names used in this paper has been changed and a pseudonym has been used.

DATA ANALYSIS--FINDINGS

While analyzing the data, it was found that science standard played a huge role in the middle-school science teachers' teaching, who considered content and vocabulary important for students' science learning. In order to teach science content and vocabulary to the students, middle-school science teachers especially depended on technology along with hands-on activities, lab work, and field trips. Based on the data, following themes have been formulated and described in detail below.

USE OF TECHNOLOGY TO PROVIDE SCIENCE CONTENT AND VOCABULARY

Providing science content knowledge is one of the emphases of science teaching. In the past, science contents were taught in a traditional didactic approach, which is basically teacher-centered. However, teachers in this study have adopted various pedagogies to teach science content as well as vocabulary. Teachers, in this study, understood that students do not get science vocabulary in their homes. For instance, Ms. Lopez said, "you know, you do not sit around and talk about mitochondria and diffusion at the dinner table. I think vocabulary is huge

one." For her, science content and vocabulary are learnt in schools and it is important to provide students the content and vocabulary.

Furthermore, science learning is understanding the natural phenomenon and laws of the nature, and technology acts as a medium to understand the natural phenomenon (NRC, 1996). For Mr. Watson, it's really important that the kids know how to read and get the vocabulary down. He said, "…vocabulary and having been able to read and understand and be able to talk that way [scientific way], to understand what it means to investigate, do scientific method, think for themselves and figure things out on their own." This suggests that science teachers considered vocabulary important for science learning.

To provide content knowledge, teachers used different pedagogies and one of them is hands-on activity. For example, one of the lab work students conducted and enjoyed was dissection of vertebrates to learn the internal organ system. However, teachers not only used hands-on activity to provide students the science content and vocabulary, they also "accommodate[d] technology to their existing pedagogy to support students' learning" (Rajbanshi, 2017, p. 179). For example, Mr. Cortez used technology to provide students with science vocabulary. He said, "quizlet for vocabulary is just great because they can test themselves on how they are doing. I can get data, because they are part of my class. I can see how they are doing. So, I like quizlet for vocabulary." Thus, these statements suggest that "technology is becoming a part of science teachers' repertoire to connect students with the content" (Rajbanshi, 2017, p. 179). Edelson (2001) also said that use of technology in Learning-for-Use model supported students with deeper content understanding. Thus, use of technology in this study was to support students with elaborative science content as well as vocabulary.

INFLUENCE OF SCIENCE STANDARDS ON TEACHING

With the view of making science consistent throughout the nation and to make students scientifically literate, science, math, and literacy standards are implemented in the schools (AAAS, 1996; NRC, 1996, 2012). The main aspect of these standards is to provide students with the content knowledge in an inquiry-based approach utilizing technology to bring change in teaching and learning. However, the scenario of public schools is different; standards have taken deep roots in the public schools. Teachers modify their lessons based on the standards. Learning has become more test-driven, which isolates students from their interest (Rajbanshi, 2017; Bybee, 2013). Teachers do not have much control over the curriculum (Snider & Roehl, 2007). For example, Mr. White said, "instructional guide is what guides me every day and I read my lessons from there." To add to this, Ms. Lopez said, "So, I make sure, I hit the standards and teach according to the standards."

Even though teachers realized that scores of the standardized testing is not what the students take away from their class, standards and testing have huge influence on middle-school science teachers' teaching and how they based their lessons. Some examples of how standards influence science teachers' teaching are provided below.

Mr. Watson said, "sometimes, you even alter what you teach, based on what you are anticipating the test questions are going to be." Not only are the teaching are affected by the testing, teachers are also emotionally hurt by the testing. For example, Mr. Watson added,

> Teaching gets harder and harder, because, they stress the testing… So, how a kid does in my class determines how good of a teacher I am on, a test. So, that's judging a race car driver based on a car that he is driving. If you get a race car driver, you [he/she] can do the best in the world, but if you have a poor car, he is not going to finish well on the race and some kids perform different on the test…

These statements show that teachers are in constant pressure to fulfill the requirement of the standards. So, they base their daily lesson trying to cover the standard and its requirements. Furthermore, standards puts students' interest at the bottom and stakeholders and districts interest at higher level (Marsh & WIllis, 2007). The assessment-based standards bring only superficial change in the science education (Kubieck, 2005). The assessment-based standards will not make students critical thinkers and a citizen who can implement science understanding in the real world. Thus, there is necessary to bring change in science teaching and make it student-centered learning by focusing on students' interest. The following paragraphs on technology show how middle-school science teachers are using technology to make science learning fun in student-centered approach as well as provide students with the content knowledge.

TECHNOLOGY USE IN SCIENCE CLASSROOM

Based on the pattern of technology use amongst the middle-school science teachers, following sub-themes are generated. Through data analysis, it was found that teachers used technology mainly for research, communication, to provide individualized instruction and for presentation, the details of which are provided below.

RESEARCH. Observations of the classrooms and interviews of the teachers showed that middle-school science teachers frequently use technology in the classroom and mostly for students to do research. When the classrooms were observed, teachers used technology in the class for research which was one of the results of Dunleavy, Dextert, and Heinecket, (2007) study. This study also found out that teachers used technology to find up-to-date information, to engage students, to do project work and let students present their finding. For instance, Mr. White said,

> For example, we were learning about human development. So they had to choose between conception to birth and it's hard to teach every month. So, I make sure that every group has a coverage of one of the months … so that they get the concept from their peers and plus it's good for them to learn and research, have research skills, learn how to look for the information.

The statement of the teacher showed that research is one of the reasons for students to use technology in the classrooms. Furthermore, the use of technology in this case was to find relevant information in which students worked in group and find information and presented in front of the classroom. These data showed that research is one of the most common use of technology in the classroom.

COMMUNICATION AND COLLABORATION. These days, students use different social media such as Twitter, Facebook, Instagram and other means of communication (Turkle, 2012). Communication through technology has become essential these days. Not only students, but teachers also use technology to communicate with parents regarding students' needs and progress, as Ms. Lopez mentioned "It's a neater way to get the parents involved because kids, especially middle-school kids are not good at getting notes home." This shows that technology is a way to communicate with parents and make them involve in their children's academic growth.

In addition, collaboration is another component of technology that helped students progress in their learning. Technology increases students' interaction among themselves and collaborate (Dunleavy et al., 2007) which is also true for this study. For example Mr. Cortez said,

> In my previous three years, what I have been doing is that I have had partner classrooms in other countries. So, I partner up with teachers from Mexico, Ethiopia, and Vietnam, and we would do like Skype sessions with our classrooms and they will do a project and we will do a project and we will compare our results and things like that.

This shows that science teachers use technology for communication and collaboration. This collaboration with other countries' helped not only his students but also the students in other countries. The students learn from each other even though they are in different parts of the world, as Dunleavy et al. (2007) states that one of the computer uses in the classroom is for collaborating and sharing their work. To this, Neilson, Miller, and Hoban (2015) added technology can be used to learn from one another as a learning tool. Access to technology creates a new phase in the evolution of technology-enhanced learning (Chan et al., 2006). They also concluded that "by extending the social spaces in which learners interact with each other, these developments, supported by theories of social learning and knowledge-building, will influence the nature, the process and the outcomes of learning" (Chan et al., 2006, p. 23) which is also one of the findings of this study.

INDIVIDUALIZED INSTRUCTION. In a class of twenty five to thirty students, it becomes hard to individualize instruction based on each student's' need. Technology helps individualize instruction (Rajbanshi, 2017; Jong, 2016). For example, Mr. Watson use Techbook and said,

> The Techbook... engages a lot of my lower-level population, a little better. Because it is self-paced and there are video-clips that go along with the reading… So technology has been helping with my special education population, my English Language Learners or Spanish speaking population and my AES advanced kid too and then they can go ahead and do a lot of things no one else get to do. So, it helps to differentiate instruction.

In addition to the above statement, Mr. Cortes stated, "Smart boards are good especially for like remedial lessons for those students who need that extra practice and smart board is really a good tool for that." Thus, the above data suggest that technology can individualize and differentiate instruction based on students' needs. It can be inferred that technology can transform learning when it facilitates individualized instruction, which was also the result of Dunleavy et al.'s, (2007) study which stated that use of technology increased the ability to individualize instruction in a 1:1 student to networked laptop classroom.

DISCUSSION

Through data analysis, it was seen that the middle-school science teachers regarded technology as an important way to provide students with content knowledge. Rajbanshi and Brown (2015) mentioned that "learning occurs when students are engaged" (p. 217) and hand-on activities along with technology engages students in learning. Ms. Lopez said, "I think, a lot of it is hands on, getting them out in the field." Thus, teachers in this study considered hands-on activities and technology important for science learning. The following paragraph illustrates answers to the research questions posed in the beginning of the study.

The question posed in the beginning of the research was *How are science teachers utilizing technology in science classrooms located in Southern New Mexico?* To answer this question, evidence provided from interviews along with the themes that emerged from the data were considered. Based on the themes that emerged from the data, it can be concluded that teachers' use of technology was basically for allowing students to do research, to do presentation,, to individualize instructions and for communication and collaboration. Likewise, the teachers in this study allowed students to use available technology to explore and investigate on the topic of their interest for research purpose. The teachers in this study rarely used PowerPoint as a method of instruction. Lecture using PowerPoint was observed only one time and the purpose of the lecture was to provide students with the instruction. After the instruction, the students performed their hands-on activity. Thus, it can be suggested that the teachers in this study utilized technology mainly for students' learning through research, presentation, and collaboration.

The second question that guided this study was *What are the effects of using technology in middle-school science teacher's pedagogy?* The participants of this study used technology in a regular basis. As mentioned before, the teachers depended on hands-on activities to provide students the content knowledge. However, many times, hands-on activities and field trips are not possible due to limited resources and funding. In one of the schools, teachers raised funds to buy frogs for dissection and for field trip, as the schools did not provide enough money to buy frogs for dissection or for the field trip. To illustrate, Ms. Bennet explained, "We do seventh grade fundraiser and we do a science fund raiser… So, we were able to buy frogs for frog dissection with that." In such situation, when resources are not available, technology becomes an alternative to teach and learn science. It was also observed that the students used iPads to learn about the internal organ system of animals before they could get frogs for dissection. Thus, it can be stated that teachers in this study considered technology as one of the pedagogical tools to teach science to the students.

CONCLUSION AND RECOMMENDATIONS

The world is changing with advanced technology and "technology has much to offer in improving teaching and learning" (Ediger, 2014, p. 649); therefore, teachers need to embrace technology and utilize it in the classroom. Technology can be used as an art, a pedagogy to transform students' learning. To transform students' learning, there has been a shift in teachers' focus from content to pedagogy and now with the inclusion of technology in the classroom, to technology (Mishra & Koehler, 2006). In this study, the middle-school science teachers basically focused on hands-on lab work, and now with inclusion of technology, technology has become a part of their pedagogy to provide quality instruction. Whenever, hands-on activity or lab work or field trip is not feasible, technology was an alternative.

The purpose of this study is to explore and document middle-school science teachers' technology use in their classrooms and its effect on their teaching. This study showed that middle-school science teachers considered content and vocabulary important for science teaching. Even though the teachers in this study believed that the scores of the standardized test do not denote students' science understanding, their teaching was influenced by the standardized testing. In order to provide students content knowledge, these teachers used technology to let students explore on the topic, to get up-to-date information, to do research, to present their work, to collaborate, and to individualize instruction, which depends on teachers' perspectives and beliefs on technology (Rajbanshi, 2017). Furthermore, the teachers of this study considered technology a part of students' learning tool and incorporated technology in the curriculum.

Can technology make students think critically? We as educators need to help students learn on their own and make them life-long learners. Technology should be a way to learn science, and teachers should encourage students to use technology as a knowledge construction tool and learning tool to get them involved in science learning. To conclude, in this triangle of teacher (content expert), student (the learner, who knows how to manipulate technology), and technology (a learning tool), technology is the bridge to teach science contents to the students where the teacher acts as a facilitator. In conclusion, it can be stated that these teachers used technology as a liaison to provide students the content knowledge.

The researchers also noticed that there is a relationship between a) number of teaching experience with technology use in classroom; b) teachers' technology use in personal life has direct or indirect impact on technology use in classrooms; and c) teachers' mindset and technology use. The researcher recommends further research in these areas in near future.

It is also recommended that teacher integrate technology frequently in the classroom for maximum effect in the classroom because teachers' technology use directly affects students' technology use. Moreover, integration of technology in inquiry-based approach encourages students in learning on their own; use of technology should be done in inquiry-based approach.

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