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21ST CENTURY TECHNOLOGY INFLUENCES ON PEDAGOGY AND LEARNING STYLES' RESEARCH

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Abstract

Twenty-first education learning and teaching must include application of research that meets the needs of all students with different diverse learning styles. Historically, instructors understand and implement instructional strategies that are connected to the current research about learning styles. Additionally, all instructors must now point to the current educational technology and how this new technology must be included in developing and application of activities/lessons that also address these diverse learning style. In addition, it is important to also provide this specific type of pedagogy to expand typical teaching strategies in order to make additional modes of learning available to all students. This interactive article will address the ways that learnings styles research can be connected in practical ways with 21st century contemporary technology to assure academic success for all.

Keywords

Learning Styles, Auditory, Visual, Kinesthetic, Educational Technology, Scaffolded Learning through Technology

1. Introduction

This article will focus on the evolution of learning styles research as it relates to learning and teaching in contemporary education. Further, this article will include the importance of the contemporary diverse student group and how this variable also must be considered along with individual student learning styles. Lastly, the article will introduce an new variable, that of technology use, as instructors work to augment the learning and teaching processes to enhance the students' environment for learning success.

1.1 Historical Perspective of Learning Styles

Traditionally, research has concentrated on three different learning styles; auditory, visual, and tactile/kinesthetic. However, as research has evolved, much research has been added additional learning styles. In addition to the typical auditory, visual, and tactile/kinesthetic learning styles, current research also includes logical, verbal, physical, aural, social, and solitary among others (Prieto, 2016). To set the foundation for this article, it is important to establish the historical research and context about learning styles, and then to expand this research to include additional research that has been added to the body of literature, regarding use of technology as a learning and teaching tool.

As instructors approach learning and teaching styles, they typically would think of their students as auditory, visual, or tactile, kinesthetic learners. With these variables in mind, instructors learn their students' preferred learning style and approach pedagogy with these individual learning styles in mind as they plan, implement, and assess students' mastery of new content. Review of the historical literature demonstrates that in any group, there is always a majority of visual leaners. However, research also reveals that most instructors at every level still plan, implement, and assess mastery of new content via the auditory mode. Thus, this approach does not give other types of learners with different learning styles the equal chance to access new curricula and learn new concepts and the opportunity to show they have mastered new concepts (Celli & Young, 2014).

Auditory learners need a learning environment that is consistent with this preferred learning style. This includes a learning environment that encourages the students' verbal, aural, abstract sequential nature, the memory orientation, and the mastery-orientation of the students. Further, an appropriate learning environment for these learners is one that understands their positive, competitive tendencies in the learning process and the need for achievement at a high

level, these types of variables are all interconnected for auditory learners and instructors must organize learning environments and learning experiences with these at the forefront (Tomlinson & McTighe, 2006).

In a different way, visual learners need learning environments that address their unique learning needs. These needs are different and sometimes, but not always related to the auditory and tactile/kinesthetic learners' needs in a classroom. Therefore, a clear understanding of earning needs for visual learners is necessary. The historical variables necessary for focus for visual learners include validating the need for abstract random thinking and activities, the need to be active and sometimes verbal, as these learners attempt to understand whole concepts, and they are field sensitive. Visual learners take information from the environment as a whole and interact with this information to understand it and be able to apply it. Therefore, the information in the environment must be accurate as students' progress through new learning. Additionally, visual learners need to interact with new concepts and new information. At times these learners appear to have thinking that is "all over the place". But the reality is these students are taking apart a whole concept and breaking it down into smaller pieces for full understanding. It is crucial that visual learners are given new information in a visual format such as a graphic organizer, a Venn diagram, or a concept map. These types of visual aids assist this learner in making sense and eventually mastering new concepts ("How to Use Technology for Different Learning Styles", January, 2018). They typically will process new concepts or new information by using the process of visualization from the aid give during the learning process (Goodwin, 2011)

Lastly, the smallest segment of any given group are the tactile/kinesthetic learners. Even though these learners represent a small fraction of students, their individual learning needs must also be addressed in any learning environment. These learners also have some similar learning needs as auditory and visual learners. However, tactile/kinesthetic learners often have behaviors that are misunderstood. Their behaviors are sometimes viewed as acting out, not following directions, or blatantly ignoring instructor guidelines for lessons and activities. Some characteristics of these learners are the need to be interactive, always in motion, and needing hands-on work. Lessons or activities that involve problem-based learning are best for tactile/kinesthetic learners, as they learn best and can demonstrate mastery of new concepts "by doing". There is a need for these learners to have the opportunity to interact with new material as well as to be allowed to be creative in a the ways they learn the new material, and how they are assessed for mastery of the new material. The tactile/kinesthetic learner in dependent and

independent based on the type of learning situation, and they tend to think and act in a very concrete sequential way (Erwin, 2004).

1.2 How Diversity Interfaces with Application of Learning Styles Demographics

In contemporary education, the demographics have shifted dramatically. The student population has shifted to having varied student populations in typical urban areas, and now in suburban and rural areas. Students from various cultural backgrounds have different access and comfort level with 21st century technology. Attention to the fact that students from various demographics may not have 21st technology skills as well as the ability to access the technology that would allow them to address their preferred learning style is needed (Reich, 2018). The key for all learning and teaching is deep attention to the specifics of the learning needs of students who are not all the same either from a demographic or learning style perspective. It is simply not enough to assume that pedagogy and planning all lessons and activities is the same for every student in every classroom at every level. Some research refers to the potential differences in learning needs as well as learning styles that diverse learners bring to learning environments as a "digital divide". This digital divide is very prevalent in many learning environments. Attention to this divide must be planned for in every classroom so as to assure all students have learning needs addressed in a variety of pedagogical approaches for the lessons and activities as well as for all assessments and evaluations of mastering skills (Reich, 2018). A research-based approach to clear, ongoing, and consistent communication and reflection to assure understanding of all student learning needs and teaching pedagogy needs in order to c Reflection and research regarding student diversity and all learning styles research will allow instructors to come to a concrete an substantive understanding of learning needs for all. Bidirectional communication between teacher/student, student/teacher, and teacher/home environment informs this deep reflection and thus informs all learning and teaching and allows for instructor attention to personal student learning needs and encourages academic success for all students (Celli, Young, 2014).

1.3 Reflection on Changing Student Learning Needs: Monitoring Data of Student Population

As instructors address the diversity of students in all classroom settings and connect how this diversity translates to academic success, it is critical that biographical data and academic assessment data toward mastery of required skills be monitored on a ongoing and regular basis. Monitoring trends for these data is an important part of the overarching teaching and learning processes. Using these data for mastery of required skills and understanding the trends of these

data inform pedagogy for instructors and assist instructors with planning and assessing all skills and planning for multiple and varied ways that students can demonstrate and/or show mastery of new and necessary content (Celli, Young, 2014).

1.4 Affluent/Non-Affluent Schools and Classrooms

A major issue that flows from the research on the intersection of diversity and learning styles is for all instructors to supplement their lesson and activities is understanding the differences in access to all types of technology. Students from affluent communities and schools are far more likely to have access and be able to manipulate 21st century technology successfully. This successful access and manipulation of 21st century technology not only supports academic success, but also allows students to advocate for themselves so this access and manipulation to support their own individual learning needs. Students from communities and schools that are not as affluent do not have the same access to the most up to date technology. As a matter of fact, some students may only have their own public library and access to only a very basic computer. Therefore, instructors must always be mindful and aware of this major gap. The questions then become exactly how do instructors supplement the access to 21st century technology and modify all planning and instruction to address the differences in access and the differences in learning styles to promote student success? Having data around this prompts instructors to do their best at supplementing curricula and resourcing in different ways or use classroom-based technology in multiple ways, so the access and manipulation to 21st technology becomes as equal as possible for all students no matter what type of community or what type of school or what background students are from. Research shows that approximately two-thirds of people have access to the Internet and therefore to the what the Internet can provide to aid in the teaching and learning processes. This implies the approximately one-third do not have access to this technology; which means that instructor must find creative an innovative ways that this gap does not prevent all students equity in access in the learning environment. Bowles (2018) states that not attending to this gap makes students part of a 21st century social experiment, putting the less affluent student at risk for not making adequate academic progress compared to their more affluent peers. If the focus is on how to close this divide, this would lead to more positive learning outcomes for all students. Instructors, therefore need to add technology access and data/information about individual student learning styles to all planning, implementation, and assessment.

1.5 Effects of 21st Century Technology on Contemporary Learning Styles: Learning and Teaching

Using 21st century technology along with data from individual student learning styles is of critical importance in any learning environment. Since contemporary technology has multifaceted ways for students to interface with new concepts, information, and data, instructors must include this focus in all pedagogy. As Buchwald (2013) states, it is important to approach all new skill sets with possibly an aural introduction, perhaps followed by a graphic presentation, and even perhaps include a format for students to actually interact with these new skills by providing an application exercise. He goes on to suggest that designing of one's own web site to post new information, share already taught information (for students who have a medium for review), and to additionally provide practical application of new material are important ways to expand pedagogical approaches. The advance of technology now allows instructors and students much easier access to much data and information for the purposes of introduction, review, and eventual mastery.

The expansion of the resources and materials available electronically has made expanding pedagogy more accessible to instructors and students. Walsh (2014) states that by engaging with valid and reliable resources, available electronically lessons and activities can bring an elevated sense of motivation and engagement for students. As research states, active engagement leads to increased student academic achievement. Contemporary technology has become so prevalent that is gives students the opportunity to think critically and to be able to show mastery of skills in multiple modes. If available, there can be many technological teaching approaches integrated in lessons/activities. These include use of a computer or iPad to allow students to independently interact with required information. This actually is aligned with the historical needs of the all learners and all learning styles, as discussed earlier in the article. Further, there are applications available such as PollDaddy and PollEverywhere, whereby instructors can be doing formative assessment as lessons and activities are being implemented; thereby always having data as to know exactly what mastery level students are at with every new skill set (Walsh, 2014); ("How to Use Technology for Different Learning Styles", 2018).

A very new teaching strategy is found in research and is referred to as using "gaming" techniques in the learning process. This process includes an element of competition in that students are asked to utilize all types of technology to get understanding, mastery, and accurate new information. Using technology to interface with a variety of integrated technological applications can make the utilization of the gaming premise easy to implement. (Walsh, 2014). Once again, this

approach addresses historical learning styles, while integrating 21st century technology. Additionally, this approach allows students to interface with technology at their own pace and there can be multiple students who arrive at the correct answers and eventual mastery. It offers the instructor the chance to organize this gaming approach in a variety of ways that fit the individual needs of classrooms as well as students. The days of planning, implementing, as assessing all students in the exact same way are no longer appropriate, given all the research that is now relevant about multifaceted pedagogy, differentiated learning, and individual student learning styles. Something as simple as an interactive whiteboard and use of interactive Smartphones illustrate a pedagogical approach that addresses all of the above. Instructors have been using these technologies in their personal lives and must research exactly how to appropriately use them in their teaching on a regular basis. Finally, with all of the 21st technology available, being conscious of the importance of collaboration in all lessons and activities is also critical. Adding this valuable variable also addresses the historical learning styles' needs of all students. Finally, instructors must continually provide multiple ways to get feedback, gather formative and summative data, and use this information to modify all teaching practices as necessary to assure student access to all curricula (Whittenberger, 2013).

2. Summary/Conclusion

Building on the historical research of learning styles: auditory, visual, and tactile/kinesthetic, instructors must now address learning needs and various learning styles with 21st century technology in mind. Twenty-first century technology plays a major role in how instructors look at current learning styles research, and it further influences how differently they now plan, implement, and assess new content at every level. Identifying and understanding the diversity in all learning environments, such as lecture or project-based learning, as well as the diversity in learning styles will promote learning environments that have equal access and equity of 21st century technology. Learning environments must address individual students' learning styles and backgrounds and assure these are valued and addressed in the teaching process. These learning environments must be organized with pedagogical styles that have varied approaches, appropriate resources addressing all students' learning needs, and have assessments and evaluations to assure that every student, with every learning style, from any background can demonstrate success and mastery throughout all their learning experiences.

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