Richard Clark's "Mere Vehicles" Debate

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Introduction and Purpose

Richard Clark (1983) started a now decades-long debate regarding the effectiveness of different media sources for instructional purposes by stating,

> The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition. Basically, the choice of vehicle might influence the cost or extent of distributing instruction, but only the content of the vehicle can influence achievement. (p. 445)

Clark's position is that the medium utilized to deliver instruction is only a delivery vehicle for content, and student outcomes are influenced by some other aspect of instructional methodology. Opponents to Clark's position state that the medium used to deliver content does influence learning. The purpose of this paper is to examine Clark's position, the position that opponents have taken, and how this topic relates to the education of physical therapy students.

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Target Audience

The target audience for this white paper includes physical therapists and other allied health care professionals and educators. This would consist of individuals who are involved in teaching students of physical therapy, occupational therapy, speech-language pathology, physician assistants, athletic training, and nursing, among others. While this paper makes reference to the unique nature of allied health education, specifically physical therapy, educators in any field of study may benefit from the content provided in this document.

Two Sides of the Debate

The two main views discussed include the following:

- Clark: The medium used to deliver instructional content does not influence

learning and student outcomes. (Clark, 1983, 1994). Other aspects of the instructional design and pedagogy are responsible for student achievement.

- Kozma: The media used to deliver instructional content do influence learning and student outcomes due to a combination of the capabilities of the media and the instructional methods used to deliver the content (Kozma, 1994).

Richard Clark's Position

Richard Clark stated in 1983 that the medium, or vehicle, used to provide content to a student is just that, merely a vehicle by which content is delivered (Clark, 1983). At the time that Clark made this assertion, he stated that the long history of research studying the influence of media on learning mostly suggested that media do not influence learning. Furthermore, he stated that the studies which did favor one medium over another often suffered from some confounding variable, such as curricular reform, instructional methodology or content differences between the media treatments, and/or a novelty for newer media. Additionally, he stated that the results of early studies on media and learning are often mistakenly interpreted as suggesting benefits for various media, when in fact the focus of the studies was on methodology (cueing, repeated exposure, etc.). Clark (1994) warned against the confusion that is often found between design technology, which influences student achievement, and delivery technology, that is needed to provide efficient and timely access to instructional methods and environments.

Clark also indicated that once method and medium are separated, it may be possible to explain significant amounts of learning variance (Clark, 1983). Several research studies are critical to Clark's argument, including one by Kulik et al. that indicated the positive effect for media disappears when the same instructor prepares content for contrasting media (Kulik, Kulik, & Cohen, 1980). In addition, Clark contends that if other media, or another set of media attributes, yield similar learning gains, then the gains are not due to the media, but rather to instructional methodology (Clark, 1994). As such, the core of Clark's hypothesis is that there is not a single media attribute that serves a unique cognitive effect for a learning task due to the fact that the same effect can be accomplished with a variety of media types (Clark, 1994). If this is true, media attributes must be proxies for other variables that are necessary for the achievement of learning (Clark, 1983, 1994).

Clark's conclusion regarding media comparison studies is that regardless of how the content is delivered, if the cognitive processes necessary for learning are activated, then learning will occur. Because any number of media are capable of stimulating the same cognitive processes, it is inappropriate, in Clark's view, to conclude based on the research, both then and now, that learning benefits may be gained by a specific medium or medium attribute used to deliver instructional content.

Opponents to Clark's Position and Clark's Response

Robert Kozma addressed Clark's position in 1994 by stating "Perhaps the appropriate question is not do but will media influence learning" (Kozma, 1994, p. 8). Kozma (1994) posited that perhaps no relationship between media and learning has been discovered because one has not yet been made. Furthermore, he stated that if the potential relationship between media and learning is not understood, then one will not be made, and as such the "mere vehicles" concept is likely to diminish any chance of understanding the potential relationships.

In addition, Kozma (1994) asked researchers and educators to think about media in terms of the underlying structure

and causal mechanisms that might interact with cognitive and social processes. He stated that each medium can be defined and distinguished by a profile of its capabilities, which would then give it the ability to present certain representations and perform certain operations when learners interact with it. In this way, each medium is unique in its ability to influence learning. Furthermore, Kozma thinks that Clark's separation of media from method creates an unnecessary and undesirable divide between them, and that medium and method should be integrated in the design process. Therefore, according to Kozma (1994), "In good designs, a medium's capabilities enable methods, and the methods that are used take advantage of these capabilities. If media are going to influence learning, method must be confounded with medium" (p. 20).

Chris Dede (2007) agreed with Kozma, and stated,

> Knowledge does not intrinsically radiate from computers, infusing students with learning as fires infuse their onlookers with heat. However, media are able to aid various aspects of learning, such as visual representation, student engagement, and the collection of assessment data. (p. 23)

While Dede does not completely refute Clark's ideas, he does indicate that in his opinion, Clark is being overly narrow in his perspective about cause and effect. Therefore, both Kozma and Dede support the continued study of educational media because of their belief that specific types of instructional media may have unique properties that could directly change teaching and learning, and thus influence student achievement.

Clark (1994) responded to Kozma's article by stating that the studies Kozma utilized to support his claims failed to control for variability in instructional methods and were confounded. Clark maintained his position and relied on his replaceability test to refute Kozma's challenge. According to Clark's replaceability test, if a treatment can be replaced by another treatment with similar results, then there must be some shared and uncontrolled properties of both treatments that is the cause of the results (Clark, 1994, p. 22). As such, Clark's response to researchers and educators is to choose the less expensive and most cognitively efficient medium by which to deliver instructional materials.

"Mere Vehicles" Debate and Physical Therapy Education

Physical therapy education has undergone a major change in the past few decades. The profession has moved from an undergraduate to a graduate degree, has benefited from high consumer demand, and has a favorable job market (as do many other allied health professional programs). As a result, physical therapy educational programs have sought ways to satisfy demand for workers, while also improving access to education.

The question of how specific media and instructional methodologies influence learning continues to be relevant in this day and age of physical therapy education. There is a need to deliver quality educational content to a wide and diverse group of students in order to fill the need for physical therapists in the future. Furthermore, with the increase in students comes the burden of teaching all of them. It has become increasingly difficult to fill open faculty positions with qualified applicants for a number of reasons, including salary, workload, and required faculty qualifications based on accreditation standards. Accreditation standards and an increasing scope of practice have resulted in programs delivering more information in the same time frame to students. As such, the need to rely on educational technology to supplement conventional teaching approaches has increased with a desire to provide content in the most efficient manner possible.

Given the unique nature of physical therapy education, including the need to teach students in the cognitive, psychomotor, and affective domains, there has been at least some question as to the usefulness of different media in teaching students in all three domains of learning. Few research studies have addressed media effects on student learning in multiple domains. A systematic review of 22 research articles conducted by Macznik, Rieiro, and Baxter (2015) concluded that the use of online media to deliver content has some benefits to offer for teaching physical therapy students. Student performance of practical skills and knowledge acquisition improved with the use of online media, and user perceptions of the technology were mostly positive. However, the question remains if these studies controlled for any confounding factors that may have been responsible for the difference in student outcomes. This issue was not addressed by the authors of the review.

If Clark is correct, greater importance may rest in determining the instructional methods and designs that will achieve the desired learning outcomes, as opposed to finding the best medium by which the content may be delivered. With the disparity in resource allocation and funding between programs, focusing on methodology may be more beneficial than on media, as newer technology tends to cost more than conventional media without necessarily leading to improved outcomes. Also, utilizing research to determine the effect of different instructional methods within newer media may lead to a better understanding of both the cost effectiveness and efficiency benefits that can be gained with the use of certain educational designs in a given medium.

A potential question to Clark's argument with regard to physical therapy education is in reference to the national licensure examination. The examination for physical therapists is only delivered through one specific computerized testing program. The question remains whether or not exposure to computerized learning and testing methods has an influence on the ability of a student to successfully pass the licensure examination. In this case, there is no other way to simulate the medium through which the licensure examination is delivered to the student other than through a computer program. However, according to Clark, as long as instructional designs that simulate the cognitive processes needed to pass the licensure exam are built into physical therapy educational programs, there should be no difference in outcomes between students exposed to computerized educational media and those who are not.

Conclusion

Clark has argued time and again over the course of several decades that instructional media are good for storing and delivering educational content, but are not responsible for the learning effect (Simonson, Smaldino, & Zvacek, 2015, p. 12). Simonson et al. (2015) summarized Clark's view by stating that learning is not enhanced because the instructional content was media-based, but rather the content, method, and learner involvement all play a role in learning outcomes.

Clark's logic makes sense. The medium is a delivery vehicle for the content, but does not necessarily change the outcomes in and of itself. Rather, it is the methodology by which the content is organized and delivered, and the attributes of the methodology (which may be included in the instructional method despite the media used to deliver the content) that should be credited for any changes in student outcomes. When similar outcomes may be obtained from different instructional media (Clark's replaceability test), the most economical medium (either with regard to time or cost) should be the medium of choice. In this way, student outcomes may be obtained in an efficient and cost-

effective manner. In the case of physical therapy education, there is a growing need to continue to study instructional methods that are both cost-effective and efficient. One potential question to Clark's argument is when only one medium is utilized to assess student outcomes. In this instance, it is unclear if there is a relationship between the medium used for assessing student knowledge and the medium used to instruct the student in that knowledge. Well-designed research on this particular question would be beneficial to physical therapy education.

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