The "Media Effects" Debate on Learning

How This Might Influence Physical Therapy

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Introduction

It has been more than 35 years since Richard Clark (1983) sparked controversy by disputing the effectiveness of media on learning by writing:

> 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. (Clark, 1983, p. 445)

Since then, Clark's position has been challenged by Robert Kozma (1994) and others who assert that advances in media technologies create an interactive relationship between the learner and the environment such that media do influence learning. Deciding who is ultimately right may not be as valuable as the knowledge gained when considering both positions, as they appear to differ widely on epistemology (Nathan & Robinson, 2001). The purpose of this paper is to discuss similarities and differences between these viewpoints and how the debate may influence teaching and learning.

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Audience

The target audience for this white paper includes physical therapy professionals who are engaged in teaching on any level. This includes those teaching students of physical therapy or other allied health professions as well as clinicians who are actively involved in teaching their patients and the public about issues related to health and wellness. This may be especially helpful for clinicians who are not as well versed in the science of learning and supporting learning theories.

Opposing Viewpoints of the "Mere Vehicles" Position

Clark's position is that the critical factor that influences learning is the instructional method, not the media used to deliver the instruction (Clark, 1983). Ironically, Richard Clark explained in a 2016 interview how he originally thought media did influence learning, and he set out to create a taxonomy regarding the ways that different forms of media might influence learning for varied subject matters (Robinson & Bligh, 2016). When he examined the existing research regarding media and learning, Clark noted a lack of control of instructional methods. His position is that researchers cannot adequately control for the effects of instructional methods when attempting to determine the isolated effect of media on learning, and any attempts to draw a causal relationship between media and learning are inherently flawed (Clark, 1983, 1994).

Clark maintains that an instructional method is necessary and key to supporting the cognitive learning process, whereas the media used to deliver the instruction may be substituted for another form if needed (Clark, 1994). Based on Clark's writing and statements, his view of learning is that the learner gains knowledge and skills through the transmission of information (Nathan & Robinson, 2001). In this view, the media used to transfer knowledge from instructor to student are generic interchangeable receptacles. Thus, Clark's view of knowledge and learning requires a separation between media and methods.

Over the years, researchers have continued to examine the effectiveness of media and technology on learning. Thousands of studies have led to multiple meta-analyses and second-order meta-analyses. One second-order meta-analysis (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011) examined 40 years of research and included 25 meta-analyses with minimal overlap. The studies included in the meta-analyses compared the impact of any form of computer technology as a supplement for in-class instruction on student performance as compared to instruction with no additional technology. Tamim and colleagues reported a small overall effect size in favor of technology-assisted instruction; however, they cited high variability in individual study-effect sizes and recommended caution regarding interpretation of these results. Ultimately, the investigators concluded that they supported Clark's view of methods over media as a primary driver for learning. Bernard, Borokhovski, Schmid, and Tamim (2018) examined the 20 best-quality meta-analyses from 1982 to 2015 that studied the effectiveness of technology on learning, specifically commenting on six meta-analyses that occurred between 2011 and 2015 after the publication of Tamim and colleagues (2011). Once again, a small positive effect in favor of technology-assisted instruction was noted, but the authors ultimately concluded that the addition of computers did not guarantee improved learning. Instead, many factors seemed to influence achievement including teacher training, instructional strategies, and methods. Sung and Mayer (2013) attempted a methods versus media comparison in which they controlled for instructional media (computer learning in a lab or mobile device outdoors) and instructional method (same information provided, but one in continuous format and one sectioned by headings and key concepts).They found both a method and media effect. The method effect was noted by improved student test performance for those who had the information sectioned by key concepts, and the media effect was noted by improved student motivation or willingness to participate in a lesson provided via mobile device versus computer. Thus, media were shown to influence motivation to learn, but that did not necessarily translate to actual learning or improved performance. As noted by Simonson (2012), the failure to control for

multiple factors that may affect learning such as materials, opportunities for collaboration, or learning time may confound the findings and subsequent conclusions of studies regarding influence of media on learning.

In contrast, Robert Kozma (1991) questioned Clark's position and argued that media impact learning. Kozma (1994) maintained that the reason no relationship between media and learning had been demonstrated was due to study design that looked at stimuli and response. Kozma's view of learning is that the learner actively creates new knowledge through a continuous interaction between the learner and his or her environment (Nathan & Robinson, 2001). He argued that studies of media and learning should include focus on the cognitive, affective, or social processes as well as consideration of underlying causal mechanisms that might influence learning. Kozma used the analogy of a tornado touching down in a town to make his point about Clark's focus on cause and effect. If someone viewed photographs before and after the tornado touched down, the extent of damage would be noticeable, but the process by which the damage occurred would not be captured. To understand the process of damage, one would need frame-by-frame observations. Kozma asserted that research on learning should examine not only outcomes but also the process of learning to provide more direct observation of causal mechanisms. Kozma (1991) theorized that computer-based learning environments that are capable of adaptation to individual student needs would allow collaboration between the learner and the media and begin to examine the interactive process by which learning occurs. Interestingly, Clark and Kozma are similar in advocating for educational researchers and instructional designers to consider the processes by which learners gain new knowledge, with the primary difference being that Clark separates media from method and Kozma supports their integration (Nathan & Robinson, 2001).

Lamb (2014) developed computational models to assess the dynamics of student cognitive processing during serious educational games in an effort to establish the effects of media on learning. Lamb, Annetta, Firestone, and Etopio (2018) later performed a meta-analysis to examine moderators of student cognition and learning outcomes while using varied forms of media including serious educational games and simulation. Effects were calculated from 46 studies and revealed that use of gaming or simulation media did not significantly differ in learning outcomes as compared to traditional instruction. Thus, despite advances in the interactive nature and sophistication of technology since Clark's "mere vehicles" statement, evidence that media directly influence student achievement is still lacking.

Implications of the Debate

When comparing the two sides of the debate, perspectives on learning and supporting pedagogies are clearly different. In Clark's view, the instructor must effectively modulate the environment and resources. Kozma takes a more constructivist approach in which the learner must actively interact with the resources and environment (Nathan & Robinson, 2001). Based on these differences, the initial step in instructional design should define specific learning goals/outcomes and incorporate an understanding of the desired learning process regarding how individuals might best learn.

When applying these ideas to physical therapy education of patients/clients or to physical therapy students, the learner and his or her comfort level with various media should influence the instructional design. For instance, patients who have difficulty reading may do better with verbal explanations and handouts with pictures to describe interventions. Follow-up emails of

home exercise programs or links to social media may not be effective choices for patients who are uncomfortable with technology. On the other hand, the use of media for telemedicine services for patients who are homebound or in a rural location with limited access to physical therapy has been shown effective in decreasing travel costs, improving quality of life, and increasing function (Levy, Silverman, Jia, Geiss, & Omura, 2015). As proposed by Clark, the high costs of education for physical therapy students demands some consideration of expense and efficiency when considering instructional design. Although students often provide positive feedback regarding the use of games and simulation, instructors must consider the associated time commitment and costs compared to more traditional instruction for the desired learning outcomes.

Conclusion

The debate of "media effects" and influence on learning continues. Despite advances in technology that have led to interactive media that engage the learner in the process of learning, there remains a lack of compelling evidence to refute Clark's "mere vehicles" statement. Both sides discuss media and instructional method but view the relationship between the two very differently. Ultimately, these differences may lie in differing epistemologies and pedagogies. The merit of this continued debate may serve educators in refocusing future research questions to better match the underlying philosophy and theory of learning in a given situation. For now, it appears that sound instructional design is a "need to do" and the use of media or technology may be more of a "nice to do." When considering the costliness of graduate school education and student loan debt, physical therapy educators must consider the relative value of using high tech media such as gaming or simulation for learning. When using an analogy of vehicles, instructional design is like the car's engine and media are like the car's trim package. The engine is the critical piece. Although it may look good to drive to the store in a Lamborghini, is it worth the extra cost when a Volkswagen is equally effective?

References

Bernard, R. M., Borokhovski, E., Schmid, R. F., & Tamim, R. M. (2018). Gauging the effectiveness of educational technology integration in education: What the best-quality meta-analyses tell us. In M. Spector, B. Lockee, & M. Childress (Eds.), *Learning, design, and technology.* New York, NY: Springer. https://doi.org/10.1007/978-3-319-17727-4_109-2

Clark, R. E. (1983). Reconsidering research on learning from media. *Review of Educational Research, 53*(4), 445–459.

Clark, R. E. (1994). Media will never influence learning. *Educational Technology Research and Development, 42*(2), 21–29.

Kozma, R. B. (1991). Learning with media. *Review of Educational Research, 61*(2), 179–211.

Kozma, R. B. (1994). "Will" media influence learning? Reframing the debate. *Educational Technology Research and Development, 42*(2), 7. Retrieved from https://search.proquest.com/docview/1308873190

Lamb, R. (2014). Examination of allostasis and online laboratory simulations in a middle school science classroom. *Computers in Human Behavior, 39*, 224–234.

Lamb, R. L., Annetta, L., Firestone, J., & Etopio, E. (2018). A meta-analysis with examination of moderators of student cognition, affect, and learning outcomes while using serious educational games, serious games, and simulations. *Computers in Human Behavior, 80*, 158–167.

Levy, C. E., Silverman, E., Jia, H., Geiss, M., & Omura, D. (2015). Effects of physical therapy delivery via home video telerehabilitation on functional and health-related quality of life outcomes. *Journal of Rehabilitation Research and Development, 52*(3), 361–370.

Nathan, M., & Robinson, C. (2001). Considerations of learning and learning research: Revisiting the "media effects" debate. *Journal of Interactive Learning Research, 12*(1), 69.

Robinson, D., & Bligh, R. (2016). An interview with Richard E. Clark. *Educational Psychology Review, 28*(4), 875–891.

Simonson, M. (2012). Introduction. In R. E. Clark (Ed.), *Learning from media*: *Arguments, analysis, and evidence* (2nd ed., pp. x–xii). Charlotte, NC: Information Age.

Sung, E., & Mayer, R. E. (2013). Online multimedia learning with mobile devices and desktop computers: An experimental test of Clark's methods-not-media hypothesis. *Computers in Human Behavior, 29*(3), 639.

Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C., & Schmid, R. F. (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research, 81*(1), 4–28.