

Review of
LEARNING FOR THE NEXT GENERATION: PREDICTING THE USAGE OF SYNTHETIC
LEARNING ENVIRONMENTS

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Dissertation Selection

A dissertation search was conducted via the ProQuest Dissertations database system through Northern Illinois University's library system to discover work related to the reviewer's interests. Keywords used were games, incremental progress meters, badges, and learning management systems. As a result, *Learning for the Next Generation: Predicting the Usage of Synthetic Learning Environments* by Arthur William Evans III was selected for its focus on the adaptation of serious games in acceptance models. The reviewer has a long standing interest in utilizing games and game elements in developing educational tools and practices for which this resource was closely related.

Summary

Problem

Evans opens with a statement that contemporary instructional practices are not reaching 21st century learners and that educators and designers need to develop better ways to aid our new, "tech-savvy" generation. While it is not explicitly mentioned, it can be reasonably assumed that by "21st century learners" Evans is referring to the "millennial" generation. He poses a disconnect with current instructional practices and how learners need more useful and engaging tools to acclimate to curriculum. He goes on to pose what he titles Situated Learning Environments (SLEs), or alternatively, serious games, as a valuable means to address this issue. Evans also cites the importance of finding the correct application of SLEs into education and training. However, without an existing model of user adoption for SLEs Evans sets out to differentiate them from other learning tools and integrate their characteristics into an existing acceptance model. He titles his expansion a "SLE Use Prediction Model."

Theory

Evans draws heavily on Davis's *Technology Acceptance Model* (TAM) (1986) and Yi-Hwang's (2003)

expanded TAM for web-based systems as the supporting framework for his study. Additionally, Evans seeks to integrate *performance goal orientations*, his proposed features of SLEs, into Yi-Hwang's expanded TAM. *Performance goal orientation* is paired and differentiated from the expanded model's inclusion of a *learning goal orientation*. Evans notes that *learning goal orientation* is based on Dweck's 1986 definition as “concerning mastery of new knowledge” and includes subsequent work on the topic by Ames & Archer (1988), Gelhbach (2006) and Ford et. al. (1998). In defining *performance goal orientation*, he differentiates *prove-performance* (VandeWalle, 1997) from *avoid-performance* (Elliot and Harackiewicz, 1996)- both of which are based on Dweck's original 1986 proposition. *Prove-performance* is defined as a “desire to show competence in a given task” (VandeWalle, 1997), while *avoid-performance* is defined as “a desire to remove oneself from tasks and situations where a lack of confidence might be revealed”(Elliot and Harackiewicz, 1996).

Researcher's Assumptions

There is a clear assumption by Evans that SLEs (i.e. serious games) contain *performance goal orientations*. There is no clear mention of why this is believed or what makes these orientations unique to SLEs in the study. Other assumptions include:

- as games, SLEs intrinsically provide the two types of goal orientations.
- SLEs will solve an instructional problem for the new generation of learners. *Evans does not cite an explicit reason why SLEs will solve an instructional problem or provide any supporting literature explaining this position.*
- part of the success of training aids is based on the “competitive nature of games”
- amusement is not considered to be the primary goal of serious games, by definition.
- SLEs are considered a natural counterparts to video games, and thus share their motivating features. *Evans does not offer a distinction between the two.*

Methodologies

Most of the Evans's methodology is based on Yi-Hwang's 2003 study. A major difference between the two is that Evans featured 275 participants to Yi-Hwang's 42 and was conducted on a much shorter time scale. The entire study (participant selection through post-test) was conducted online.

Evans utilized a human subject pool management system called SONA ("About Sona Systems," n.d.) to obtain his participants. Using this system, participants completed their informed consent requirements and provided personal background data. The participants for the study were all students from the University of Central Florida with an average age of $M=19$, considerably more females (189) than males (86) participated. Evans created a survey within the system that recorded responses on the participants' military background, GPA, class level, as well as their average computer and video game usage. Students participating in the study were offered extra course credit for their time.

The SLE that Evans chose for the study was RETRO lab's insignia trainer- a serious game for the U.S. Navy which trains cadets on insignia recognition. After completing the informed consent and demographic forms, the participants then were able to optionally review the instructions for the training program. Evans does not mention collecting data on whether or not participants reviewed the instructions. After this optional exercise, the participants moved onto the insignia trainer.

The insignia trainer itself is a simple matching game in which participants pair insignias with their corresponding terms. Points are added for correct answers and deducted for wrong answers. A score multiplier is awarded for answering several questions correctly in succession. After completing the SLE, participants then completed a post-test evaluation on insignia recognition as part of the program.

After the post test, Evans collected data for his SLE Use Prediction Model through a Likert-scale survey that was modified from Yi-Hwang's 2003 study. The participants provided feedback on enjoyment,

usefulness, ease of use, learning goal orientation, performance goal orientation (*prove* and *avoid*), self-efficacy, and behavioral intention.

Findings

Evans used traditional psychometric analyses and Structural Equation Modeling (SEM) to test his hypotheses and compare his competing models using SPSS 17.0 and AMOS 17.

Performance goal orientation was the primary focus of Evans's study. Specifically he was looking at *prove* and *avoid* orientations and their relationship with *learn orientation*. An analysis of the results demonstrated a strong correlation of the *prove-performance orientation* with *learning goal orientation*. As expected, the *avoid-performance orientation* did not show a strong correlation with *learning goal orientation*. Evans also found continued support for Yi-Hwang's expanded version of Davis's TAM.

Implications for Instructional Technology

Evans's study lends support to the concept of limited, but focused deviations from technology acceptance models. In his words “as technologies have expanded their scope it has become necessary for technology acceptance models to expand as well.” His finding that *prove-performance orientation* correlates with *learning orientation* suggests that performance orientation would be a useful tool to integrate into established technology acceptance models. This finding also suggests an increased benefit in developing interfaces that allow users to “show off” their skills within a system.

Future Research

Considering the limitations of his study, Evans cites the need for a “more involved” performance aspect. Specifically, he mentions longer exposure or repeated use of SLE as a means to validate his SLE Use and Learning Model. He also ambiguously suggests using different types of technology to “form a more universal and complete model of technology acceptance. It is not clear if these “different types of

technology” are meant to be various SLEs or some other “technology” variation. Within the context of the study, however, it is reasonable to assume that he could be referring to either.

Critique of the Literature Review

The works cited in Evans's study are relevant and credible. He makes important ties to the concepts and frameworks he draws on to justify his research. However, there is also the addition some irrelevant points and non sequitur. Additionally, very little explanation is extrapolated from the referenced works.

Throughout the review there are opportunities to explain the significance or effectiveness of a supporting study but very few are capitalized upon. These are unfortunate omissions from an already light literature review.

Literature Review: Strengths

Overall, there are more complaints to have with Evans's literature review than praises. Of the few elements that are outstanding, Evans does make an effort to create a focused, logical flow of related topics- a sentiment that he ultimately undermines with inappropriately placed content. He also makes a clear connection from the literature to the aim of his study. This makes his justification more credible with each section. His selection of sources also lends credibility to his proposed “SLE Use and Learning Model.” By using Davis's widely cited TAM and Yi-Hwang's expanded model for web-based applications he establishes a strong precedent for the expansion and improvement of existing adaptation models.

Review Process and Descriptions

Evans makes no mention of his literature review process. Absent are database searches and keywords which would aid future researchers in validating or expanding on this study. Research and descriptions of importance often come before a declaration of intent or purpose of a section or subsection. This leave the reader to infer the importance of the section or subsection after reviewing the entire study. Only then does

the logic of the organization become apparent. Personal interpretations and anecdotes litter the literature review. The author often brings in information that is not supported by previous research, usually related to the “nature” of SLEs and their perceived benefits. For example, in a section where Evans attempts to separate SLEs from other education techniques, he mentions the cost savings and scheduling benefits of SLEs, but does not leverage these qualities against other existing techniques. The entire section becomes a description of the authors perceived benefits of utilizing SLEs- only without comparison. Evans also frequently makes authoritative claims such as:

Making SLEs fun and engaging relates much closer to the role of motivation, which can in turn be quickly linked with a competitive desire and the need for performance measures

without referencing existing research on these relationships. These instances, while not the standard, are enough to interfere with the credibility of the review.

Clarity and Understanding

The literature review section takes some re-reading to understand the authors intent. The content for each section contains important information about the works referenced and we can infer their implications within the context of the study. However, these sections not only missed an opportunity to explore the concepts in further detail, but to speak explicitly about their connection to specific elements of the study. This could have been accomplished with a clear chapter summary which took existing information about *why* and *how* the author intended to integrate performance orientation into Yi-Hwang's expanded TAM.

It seems as if the construction of the review was more of an afterthought once the foundational model(s) and concepts (i.e. expanded TAM, performance orientation) of the study had been established.

Research History

Technology Acceptance Models

Evans explains the historical relationship between Davis's TAM and Yi-Hwang's expansion of the original model, but does not explore the foundational theories for these two models. It is also not mentioned if he attempted to explore other expansions for Davis's TAM and their methodologies. Outside of these two, there is a noticeable lack of history in Evans's research.

Serious Games

Notably, in defining serious games, Evans begins and ends with Abt's *Serious Games* (1970). Even in his mention of the Serious Games Initiative, there is no historical discussion on the definition or concept of serious games outside of a book written three decades earlier. It is very surprising that in spite of the importance of serious games to the study, an investigation is distinctly absent from the literature review.

Goal Orientations

There is mention of how Dweck's 1986 goal orientation developed from a continuum including both learning and performance goal orientation and a statement that recent research suggests two individual dimensions of goal orientation. Explanations as to why and how this distinction came to fact are absent. In describing the performance goal orientation, he further describes that there is a categorical distinction between prove-performance goal-orientation and avoid-performance goal-orientation. Still, there is no historical or in-depth description how this distinction came to be, except for a statement that it was developed from Dweck's 1986 study via VandeWalle (1997) and Elliot and Harackiewicz (1996).

Reaction

Surprisingly, Evans not conduct an investigation on the dominating construct of his study (serious games, SLEs), and fails to provide a robust research history of his foundational model (Yi-Hwang) or his primary contribution (performance orientation). These are serious weaknesses in the literature review and might suggest that Evans was only looking for what was needed to justify his study.

Criticisms

Organization

Organization seemed to be a major issue throughout Evans's study. This was readily apparent in the first three chapters where information was scattered and referenced as if the concepts and definitions had already been clearly established. This also led to a redundancy of information. The most pertinent example are the two sections that Evans wrote covering the same topic- "Distinguishing SLEs from Other Education Techniques" in the introduction chapter and "Separating SLEs from Other Education Techniques" in the literature review. The reviewer feels that much of the content could have been corralled into neat sections to maintain focus and to provide a concise overview of important information, as opposed to the author's reliance on redundancy to drive certain points.

Definitions

The reviewer takes a personal issue with the author's definition of games, serious games, and SLEs. Evans did not make a strong effort to define games or distinguish serious games, except for serious games being games with primarily an educational focus. This does not clarify what the parameters of what constitutes a game or how serious games are situated as a subset of those parameters. The fact that the author cites a 'virtual automobile race, in which students cars move forward with each correct answer given" to describe SLEs (again, what the author describes as serious game enabled by technology) demonstrates his inability to distinguish games or serious games from motivational software. There is also reference to the "competitive nature" of games that the author seems to think is innate. This ignores cooperative games, sandbox games, or games with a narrative orientation which would not necessarily abide by the *prove-performance orientation*. It is for these reasons that it appears Evans views games (SLEs, serious games), not as a paradigm shifting approach in educational practice, but as a shallow presentation medium meant to automate learning and performance assessment.

Data Collection

Evans collects data on participants which was outside of the scope of his study and never addresses why this data was never used. He collected participant information on class, video game/computer usage, or type of video games played, but it is never explained why and the data is not used in the final assessment.

Gains

In spite of the reviewer's criticisms, there were several positives that were taken away from the critique. Evans's work provides an important exploration into the continued expansion of TAMs. As he puts it, "as technologies have expanded their scope it has become necessary for the technology acceptance models to expand as well."

The data analysis and discussion were strong points in the study. Evans provides important research on the prove-performance orientation's relationship with learning orientation. This is an important discovery that increases the importance of integrating prove-performance tools into SLE design.

Conclusion

In conclusion, this reviewer feels that this dissertation was good for criticism and to bring to mind what he does not want in his own work. Evans completed a difficult and complex task and deserves to be commended for his efforts. There were important insights into prove-performance orientation with learning orientation in technology acceptance models that will affect the reviewer's work in the future. His ending sentiment is that Evans's dissertation was a good study with poor organization and review of related literature.

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