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Classroom Community and Online Learning: A Synthesis of Alfred Rovai’s Research

Patrick R. Lowenthal

Boise State University

patricklowenthal@boisestate.edu

<https://orcid.org/0000-0002-9318-1909>

Arielle Horan

University of Idaho

ahoran@uidaho.edu

Marc C. DeArmond

Boise State University

marcdearmond@boisestate.edu

<https://orcid.org/0000-0001-9623-4394>

Amy Lomellini

Boise State University

amylomellini@gmail.com

<https://orcid.org/0000-0002-2977-3010>

Dave Egan

Boise State University

daveegan@u.boisestate.edu

Mickinzie Johnson

Boise State University

mickinziejohnson@u.boisestate.edu

Krishna Noelle Moeller

Boise State University

krishamoeller@u.boisestate.edu

Fayth Keldgord

Boise State University

faythkeldgord@u.boisestate.edu

Jessica Kuohn

Boise State University

jessica.kuohn@gmail.com

<https://orcid.org/0000-0001-8547-8473>

Shawna Jensen

Boise State University

shawnajensen529@u.boisestate.edu

<https://orcid.org/0000-0002-0984-8409>

Auston Stamm

Boise State University

austonstamm@u.boisestate.edu

DaQuita Pounds

Boise State University

daquitapounds@u.boisestate.edu

Classroom Community and Online Learning: A Synthesis of Alfred Rovai's Research

Abstract

Increasingly researchers and practitioners have highlighted the importance of developing a sense of community in online courses and programs. However, many questions remain about the best ways to develop community in online courses. A recent literature review highlighted how influential Alfred P. Rovai's research has been to researchers of connectedness and community in online higher education. However, some of this foundational research is over 20 years old. Given this, we conducted a review of Rovai's research on community to take a deeper analysis of Rovai's research and to identify themes across the studies, future areas of research, and implications for practice. In the following paper, we present the results of our inquiry.

Keywords: classroom community, school community, connectedness, literature review, online learning, Alfred P. Rovai

Introduction

Increasingly researchers and practitioners have highlighted the importance of developing a sense of community in online courses and programs (Berry, 2019; Bond & Lockee, 2014; Borup et al., 2020; Lee, 2018; Roberts & Lund, 2007; Trespalacios et al., 2021). Research suggests that among other things a sense of community is related to student satisfaction and perceived learning (Innab et al., 2022; Lowe-Madkins, 2016; Shea et al., 2005; Shea 2006), course persistence and retention (Dueber & Masanchuk, 2001; Lowe-Madkins, 2016; Muljana & Luo, 2019), as well as enculturation and socialization into various professions (Haythornthwaite, 1998; Mackey & Evans, 2011; Wilson et al., 2004) to name a few. However, many questions remain about the best ways to develop community in online courses (Fiock, 2020; Lee, 2018; Trespalacios & Perkins, 2016; Trespalacios et al., 2021). Developing a sense of classroom community is arguably more important than ever, as colleges and universities were forced to move courses into some type of blended, remote, or online format (Hodges et al., 2020; Lowenthal et al., 2020; Stewart, 2021). A recent literature review conducted by Trespalacios et al. (2021) highlighted how foundational and influential Alfred P. Rovai's research has been to researchers of connectedness and community in online higher education. Rovai researched differences between traditional classroom experiences and student experiences in online classes, focusing on questions about the sense of classroom community in primarily asynchronous online courses. In particular, Rovai's definition of classroom community and his instruments to measure classroom community have been used or influenced the majority of research conducted to date on community and online learning (Trespalacios et al., 2021). However, despite this influence, some of Rovai's foundational research is over 20 years old and a great deal has changed in terms of technology, modes of interacting and communicating online, and pedagogical approaches since then. Given this, we conducted a review of Rovai's research on community to take a deeper analysis of Rovai's research and to identify themes across his studies, future areas of research, and implications for practice. In the following paper, we present the results of our inquiry focusing specifically on the purpose, samples, methodologies, data analyses, and results of Rovai's research. We conclude this paper with implications for future research and practice.

Method

Data Collection

We began by identifying Rovai's research on community and online learning. The first researcher searched Google Scholar using the keywords "Rovai" and "community." Initially, 30 sources were identified. Three sources, though, were excluded from the list; one source was excluded because it was a book reporting on multiple studies; another source was excluded because it was a reprint of an earlier study; and the last source was excluded because it did not focus enough on community and online learning. This left a total of 27 sources written by Rovai between 2000 and 2008 to review, which consisted of 26 peer-reviewed articles and one test booklet (note: we will refer to these collectively as "articles" throughout this paper). Four of these articles were synthesis types of papers, one was a test booklet, and the rest were empirical studies (see the Appendix for a complete list of articles reviewed). The articles had collectively been cited 11,311 times as of January 2021, when the articles were originally identified. The articles had been published in highly respected journals; over half of the articles were published in journals with high impact factors, such as the *International Review of Research in Open and Distributed Learning*, *Internet and Higher Education*, and *Educational Technology Research and Development*.

Data Analysis

Copies of the articles were uploaded to a shared Google Drive for the research team to access. The research team consisted of a faculty member and 13 doctoral students. Two researchers were assigned to read and review each article. After reading each article, the researchers annotated the articles using *Hypothesis*, a social annotation application, and entered the results of their review in a shared *Google Sheet*. The Google Sheet had places to enter different elements and aspects of each study commonly focused on with literature reviews (e.g., the purpose of the study, the definition of community, research questions, context, sample, research methods, data analysis, findings, and limitations). Each researcher then reviewed three other articles that were not initially assigned to them to improve the thoroughness and trustworthiness of the reviews entered by their colleagues. After this, in small groups, the researchers read all the themes entered into the shared spreadsheet; they identified common themes and synthesized the results in their small groups. They then shared and compared each group's synthesis before reaching a consensus and collectively writing up the results below.

Results and Discussion

We identified the following themes from Rovai's work that have implications for online learning research and practice, which we will discuss below.

Definitions of Community

Educators started placing an increased emphasis on the concept of community during the mid-to-late 1990s and early 2000s. For instance, in various degrees, educators started focusing on how communities of learners (Jonassen, 1995; Rogoff, 1994), communities of practice (Barab & Duffy, 2000; Wenger, 1999, 2000), and professional learning communities (DuFour & Eaker, 1998; Stoll et al., 2006) can improve teaching and learning as well as training and performance. However, as online learning began to grow in the late 1990s, many questioned whether community could be developed online (Berge & Collins, 1995), largely due to perceived limitations of asynchronous communication and the cues filtered out of this type of

communication (Gunawardena, 1995; Walther, 1996; Walther, Anderson, & Parks, 1994). It was around this time that Garrison, Anderson, and Archer (2000) developed the Community of Inquiry (CoI) framework and Rovai (2000) started researching classroom community. While Garrison et al. did not directly define community per se (see Lowenthal & Snelson, 2017), building from the work of Dewey (1933, 1959) and Lipman (1991), they posited that communities of inquiry consist of teaching presence, social presence, and cognitive presence. Rovai took a different approach, focusing directly on the concept of classroom community.

Rovai grounded his work in the psychology community literature (McMillan, 1996; McMillan & Chavis, 1986; Sarason, 1974; Unger & Wandesman, 1985). In fact, Rovai referenced McMillan's work in two-thirds of the articles reviewed. Working from McMillan's (1996) four dimensions of community--spirit, trust, trade, and art, Rovai initially conceptualized classroom community as consisting of spirit, trust, interaction, and common expectations: learning (see Rovai, 2001, 2002). While he did not directly define his conceptualization of classroom community in his work, when he began to work on developing a measurement of classroom community (which is discussed next), he began thinking of community in terms of a sense of connectedness, which he then broke down in terms of cohesion, spirit, trust, and interdependence. He explained (2002c) "a review of the literature suggested that the characteristics of sense of community, regardless of setting, include feelings of connectedness, cohesion, spirit, trust, and interdependence among members" (p. 201). However, by not directly defining community or even connectedness, Rovai has left researchers to guess or assume that they know what he meant. This practice, though, of not defining community or connectedness is common in the online literature (see Author, 2017 as well as popular books like Palloff & Pratt, 2007) and we contend that it limits the research conducted on community and online learning.

Measurement and Methodology

Rovai taught research methods courses in an online doctoral program at Regent University. Thus, it is not surprising that he spent a lot of time and effort thinking about effectively researching classroom community in online learning. His early research focused not only on how to conceptualize classroom community but also on how to effectively measure it (Rovai, 2001b, 2002c; Rovai et al., 2004). He first created the Sense of Classroom Community Index (SCCI), a questionnaire that consisted of 40 Likert-style questions, with ten questions aligned to four subscales (i.e., spirit, trust, interaction, and learning; Rovai, 2001b). Rovai used the SCCI in many of his own studies (see Table 2). He then created the Classroom Community Scale (CCS). The CCS consists of 20 Likert-style questions; 10 questions focused on connectedness and 10 questions focused on learning (Rovai, 2002c, p.202). Rovai used the CCS in several other studies (Rovai, 2001, 2002a, 2002b; Rovai & Jordan, 2004; Rovai & Whiting, 2005). He later became interested in the differences between classroom community and school community (Rovai et al., 2004; Rovai et al., 2005). Rovai et al. (2004) explained:

What is missing is an instrument that measures the psychological sense of community construct on a schoolwide basis that can be used in a variety of settings and educational levels, to include distance education, and that can discriminate between classroom and school communities. (p. 268)

This led him to create the Classroom and School Community Inventory (CSCI) to analyze the differences between classroom community and school community. Table 1 lists the questions from these three main instruments. One can see how the instruments evolved and how the classroom community form of the CSCI is essentially a condensed version of the CCS.

The CCS appears to be the most popular of Rovai's instruments (see Barnard-Brak & Shih, 2010; Dawson, 2006; Ritter et al., 2010; Phirangee et al., 2016). However, despite this instrument's popularity, researchers have continued to explore shortening it. Cho and Epp recently developed a short form of the CCS called the Classroom Community Scale Short Form (CCS-SF). They argue that the smaller eight-item subset "maintains reliability while increasing construct validity by reducing factor loading issues" (p. 1). They reported how some of the factor loading issues were problematic questions such as "I feel like this course is like a family"--which we talk about further later on in the limitations section.

In terms of research methods, Rovai predominantly conducted quantitative studies using the aforementioned instruments focusing on student perceptions of learning and connectedness. These surveys were predominantly administered in the last three weeks of a single university course, with only two studies following a pre-class/post-class design (Rovai & Lucking, 2003; Rovai & Jordan, 2004). Common statistical analyses involved ANOVA, MANOVA, and MANCOVA assessments to determine differences between groups within the studies (Rovai, 2002a, 2002b, 2002d; Rovai & Baker, 2005; Rovai & Jordan, 2004; Rovai & Barnum, 2007; Rovai & Whiting, 2005).

However, he also wrote a few synthesis/review types of papers as well as conducted a few qualitative studies (Rhea et al., 2007) and mixed-methods studies (Rovai, 2001b, 2002a; Rovai & Jordan, 2004; see Table 2). Future research could focus on replicating Rovai's research with larger samples, mixed methods, as well as short forms of the CSS to better understand how classroom community has evolved over the years.

Table 1*Comparison of Community Instruments*

Sense of Classroom Community Index (SCCI)	Classroom Community Scale (CCS)	Classroom and School Community Inventory (CSCI)
Spirit subscale	Connectedness subscale	Classroom
I feel excited about this course	I feel that students in this course care about each other	I feel that students in this course care about each other
I feel that there is no group identity	I feel connected to others in this course	I feel that I receive timely feedback in this course
I feel a sense of cohesion with other students	I do not feel a spirit of community	I feel connected to others in this course
I do not feel connected to my teacher	I feel that this course is like a family	I feel that this course results in only modest learning
I feel important in this course	I feel isolated in this course	I trust others in this course
I do not feel a spirit of community	I trust others in this course	I feel that I'm given ample opportunities to learn in this course
I feel close to others in this course	I feel that I can rely on others in this course	I feel that I can rely on others in this course
I feel isolated in this course	I feel that members of this course depend on me	I feel that my educational needs are not being met in this course
I feel that I'm recognized for my participation	I feel uncertain about others in this course	I feel confident that others in this course will support me
I feel out of place in this course	I feel confident that others will support me	I feel that this course does not promote a desire to learn
Trust subscale	Learning Subscale	School
I feel that others in this course are concerned about my well-being	I feel that I'm encouraged to ask questions	I have friends at this school to whom I can tell anything
I trust other students	I feel that it is hard to get help when I have a question	I feel that this school satisfies my educational goals
I feel that I receive insincere feedback	I feel that I receive timely feedback	I feel that I matter to other students at this school
I feel that I can rely on others in this course	I feel uneasy exposing gaps in my understanding	I feel that this school gives me ample opportunities to learn
I feel uneasy exposing gaps in my understanding	I feel reluctant to speak openly	I feel close to others at this school
I feel that members of this course are loyal to each other	I feel that this course results in only modest learning	I feel that this school does not promote a desire to learn
I feel reluctant to speak openly in this course	I feel that other students do not help me learn	I regularly talk to others at this school about personal matters
I distrust my teacher	I feel that I'm given ample opportunities to learn	I share the educational values of others at this school
I feel uncertain about others in this course	I feel that my educational needs are not being met	I feel that I can rely on others at this school
I feel secure in this course	I feel that this course does not promote a desire to learn	I am satisfied with my learning at this school
Interaction subscale		
I feel that there is not much interaction with the teacher		
I feel that I'm encouraged to ask questions		
I feel that I learn a lot from other students		
I feel that the learning environment facilitates discussion		
I feel that this course offers limited resources to work with		
I feel that a few students dominate this course		
I do not feel comfortable speaking openly		
I feel that my teacher is responsive to me		
I feel that discussions are one-way		
I feel that discussions are high quality		
Learning subscale		
I feel that this course is not learner-centered		
I feel that I learn useful skills in this course		
I do not feel in control of my learning process		
I feel that our discussions promote learning		
I feel that we build knowledge in this course		
I feel that this course provides valuable skills		
I feel that there is no need to think critically in this course		
I feel that this course does not meet my educational needs		
I feel that I learn a lot in this course		
I do not value all the material that the instructor covers		

Table 2
Comparison of Context and Sample of Research

Year	Title	Method	Data Collection	Instrument
2000	Building and sustaining community in async....	NA	NA	NA
2001	Building classroom community at a distance...	Mixed	Survey, Discussion, Analytics	SCCI
2001	Classroom community at a distance...	Quant	Survey	SCCI
2001	Sense of classroom community index	NA	NA	NA
2002	Building sense of community at a distance	NA	NA	NA
2002	Development of an instrument to measure class...	Quant	Survey	CCS
2002	Sense of community, perceived cognitive...	Quant	Survey	CCS
2002	A preliminary look at the structural differences...	Quant	Survey	SCCI
2003	The relationships of communicator style...	Quant	Survey	CCS
2003	Strategies for grading online discussions...	Quant	Survey	CCS
2003	Sense of community in a higher education...	Quant	Survey	SCCI
2003	In search of higher persistence rates in distance...	NA	NA	NA
2003	A practical framework for evaluating online...	NA	NA	NA
2004	Blended learning and sense of community...	Mixed	Survey,	CCS
2004	The classroom and school community...	Quant	Survey	CCS
2004	Sense of community...	Quant	Survey	SCCI
2004	A constructivist approach to online college...	Quant	Mixed*	Survey
2005	Feelings of alienation and community...	Quant	Survey	SCCI
2005	Gender differences in online learning...	Quant	Survey	CCS
2005	An examination of sense of classroom...	Quant	Survey	CCS
2005	Learning and sense of community...	Quant	Surveys	CCS & PL
2005	School Climate: Sense of Classroom and School...	Quant	Survey	CSCI
2007	Facilitating online discussions effectively	NA	NA	NA
2007	On-line course effectiveness...	Quant	Survey	PLQ
2007	The effect of computer-mediated communication...	Qual	Survey	Open-ended
2008	Distinguishing sense of community...	Quant	Survey	CSCI & AMS-C
2008	How Christianly is Christian distance...	Quant	Survey	CSCI

*primarily a synthesis paper

Context and Sample

Rovai taught at Old Dominion University and later at Regent University. He conducted many of his studies specifically at Regent University, a private Christian University located in Virginia Beach, Virginia. Research however suggests that the context and the sample of a study can impact the results (Author, et al. 2009). Rovai, like many researchers, capitalized on what he had access to. It appears that he conducted most of his research with students in the graduate education programs at Regent University (see Table 3). Overall, he conducted 15 studies involving graduate students (Rhea et al., 2007; Rovai, 2001b, 2001c, 2002a, 2002c, 2002d, 2003b, 2004; Rovai et al., 2008; Rovai & Baker, 2005; Rovai & Barnum, 2007; Rovai & Gallien Jr, 2005; Rovai & Jordan, 2004; Rovai & Ponton, 2005, Rovai & Wighting, 2005). However, he did conduct one study of 6th graders (Rovai et al., 2004) and a few others that included undergraduate and graduate students (Rovai, 2003c; Rovai et al., 2005; Wighting et al., 2008). Overall, participants in his studies were predominantly White female graduate students enrolled in education graduate programs at a Christian university. In terms of sample size, his studies ranged from 20 to 375 students with an average sample size of 219 students (see table 3).

While the first for-credit online course is often traced back to 1986 (see Harasim, 1986, 1987), online learning in the early 2000s was still relatively new and as a result, many questioned whether people could learn effectively online (Bernard et al. 2004; Saba, 2000). Rovai's research likely reflects the milieu of the early 2000s. This was a time when the internet was still relatively new to most people, and many people were still using dial-up internet. This was an era where online multimedia and social media were in their infancy (Leskin, 2020); Youtube did not exist yet.

In this era, photos, audio, and video could not be easily shared, thus likely influencing interpersonal connections. Instructors needed to rely on text-based discussion posts to share ideas and foster a sense of community. At the time, researchers found that social presence, as well as a sense of classroom community, could be developed in text-based online environments (Rourke et al., 1999; Rovai, 2001). However, more research is needed today to see how people's increased use and practice of communicating online, as well as technological and pedagogical advances, might influence not only their perceptions but even their perceived need for and importance of feeling a sense of classroom community (see Trespalacios et al., 2021). Another reflection of this era is evidenced in, Rovai's focus on comparing the perceptions of students taking in-person courses to those taking fully online courses. Given that many postsecondary institutions are increasingly offering full degree programs online, more research is needed specifically on students' perceptions of classroom community who are enrolled in fully online programs across various disciplines and levels of higher education.

Table 3
Comparison of Context and Sample of Research

Year	Title	Level	Subject	F2F, Online, Both	n
2000	Building and sustaining community in asyn...	N/A	N/A	N/A	N/A
2001	Building classroom community at a distance...	Grad	Edu.	Online	20
2001	Classroom community at a distance...	Grad	Edu.	Online	38
2001	Sense of classroom community index	N/A	N/A	N/A	N/A
2002	Building sense of community at a distance	N/A	N/A	N/A	N/A
2002	Development of an instrument to measure...	Grad	Edu.	Online	375
2002	Sense of community, perceived cognitive learn...	Grad	Edu.	Online	314
2002	A preliminary look at the structural differences...	UG & Grad	Mix	Both	326
2003	The relationships of communicator style...	N/A	N/A	N/A	N/A
2003	Strategies for grading online discussions...	Grad	Edu.	Online	262
2003	Sense of community in a higher education...	UG	Ed Tech	Both	120
2003	In search of higher persistence rates in distance...	N/A	N/A	N/A	N/A
2003	A practical framework for evaluating online...	N/A	N/A	N/A	N/A
2004	Blended learning and sense of community...	Grad	Edu.	Both	68
2004	The classroom and school community inventory...	7-12, UG &-Grad	Mix	Both	341
2004	Sense of community: A comparison...	University	Not Reported	Both	294
2004	A constructivist approach to online college learn...	N/A	N/A	N/A	N/A
2005	Feelings of alienation and community...	Grad	Edu.	Online	117
2005	Gender differences in online learning...	Grad	Edu.	Online	193
2005	An examination of sense of classroom...	Grad	Edu.	Online	108
2005	Learning and sense of community...	Grad	Edu.	Online	97

2005	School Climate: Sense of Classroom and School...	UG & Grad	Edu.	Both	279
2007	Facilitating online discussions effectively	N/A	N/A	N/A	N/A
2007	On-line course effectiveness...	Grad	Edu. & Lead.	Both	328
2007	The effect of computer-mediated communication...	Grad	Edu. & Psy.	Both	202
2008	Distinguishing sense of community and...	UG & Grad	Mix	Both	320
2008	How Christianly is Christian distance...	Grad	Edu.	Both	350

Key Findings

Four key themes emerged across Rovai's research on classroom community: course design, gender differences, ethnicity differences, and religious differences. These will briefly be discussed below.

Theme 1: Course Design

Rovai's research suggests that the way online courses are designed can influence the development of classroom community (Rovai, 2002a, 2002b). For instance, based on a review of the literature, Rovai (2002b) identified seven factors that are associated with a sense of community: (a) transactional distance, (b) social presence, (c) social equality, (d) small group activities, (e) group facilitation, (f) teaching style and learning stage, and (g) community size. While some of these factors arguably deal with facilitation as much as course design, he provided suggestions and strategies for some of these factors more than others. In his body of work, he regularly discussed the importance of using small group activities, active facilitation, and small class sizes to help a sense of community to develop.

Small group activities were recommended by Rovai primarily in the context of online discussions. Rovai (2000, 2007) recommended designing online discussions with small groups, engaging topics, a participation rubric, elements of student choice, and the establishment of group norms. He, like other researchers (Lee & Recker, 2021; Swan et al., 2006), found that grading online discussions resulted in more frequent posts, which in turn led to a higher sense of classroom connectedness and learning (Rovai, 2003b). He found a moderately positive relationship between the number of messages posted to online discussion boards and classroom community scores (Rovai, 2002c); however, he also found that online discussions making up a larger portion of the grade--greater than 10%--did not further increase the sense of classroom community among students (Rovai, 2003b).

Active facilitation was another element Rovai (2002a) emphasized. He argued that online courses should be designed and taught by experienced professionals. When discussing active facilitation, he emphasized the importance of online instructors providing feedback and acknowledgment to help a sense of classroom community to emerge (Rovai, 2000). However, he acknowledged that class size can influence how instructors facilitate their courses and how students interact with each other. Other researchers have reported how instructor facilitation and group size and class size can impact social presence (a building block of classroom community) and classroom community itself (Berry, 2019; Darby & Lang, 2019; Dennen, 2005; Dunlap & Lowenthal, 2014; Kreijns et al., 2003).

Theme 2: Gender Differences

Rovai investigated the role of gender on students' perceptions of classroom community in seven different studies (Rovai, 2001b, 2002c, 2002d; Rovai & Baker, 2005; Rovai & Wighting, 2005; Rovai & Barnum, 2007). Based on the CCS results, females reported a stronger sense of

classroom community and feeling more connected with their classroom in online courses than males (Rovai, 2002c, 2002d; Rovai & Baker, 2005). Furthermore, Rovai identified differences between how female and male students communicated. First, female students used discussion boards at a much higher rate than male students (Rovai & Baker, 2005). Additionally, male students tended to be more confrontational and used an independent voice whereas female students were more empathetic and used a connected voice (Rovai, 2000, 2001b). Female students also reported higher levels of perceived learning than male students in online graduate courses (Rovai & Barnum, 2007). However, there were no gender differences in studying the effect of alienation on classroom communities which evaluated students' norms, social isolation, and powerlessness (Rovai & Wighting, 2005).

Other research over the years has found gender differences and experiences and perceptions of online learning (Gnanadass & Sanders, 2018). For instance, Shea et al. (2005) and Shea (2006) found females reported higher levels of a sense of learning community than males. However, there are still other studies like Wu et al. (2017) that didn't find a relationship between gender and community. Additional research needs to be conducted to see how gender is related to students' sense of classroom community.

Theme 3: Ethnicity differences

Five studies presented results on ethnicity differences in the sense of classroom community and the online learning experience. Three studies noted differences between White students and Black students, while two found no differences based on ethnicity. In a study of student alienation that focused on normlessness, powerlessness, and social isolation, Rovai and Wighting (2005) reported that Black students felt more normless (e.g., less aware of societal norms) than their White counterparts while there were no differences for powerlessness and social isolation. They concluded that this greater normlessness for Black students in online classes was consistent with findings for Black students feeling a greater sense of alienation at campuses with predominantly White students. Rovai and Ponton (2005) reported that Black students gave lower scores for community and social learning variables than their White peers. Rovai and Gallien (2005) concluded that the achievement gap between White students and Black students in traditional classroom settings is also present in the online classroom setting based on differences for all five achievement variables evaluated in their study. In contrast, other studies reported no differences in ethnicity relative to a sense of classroom community using the CCS and perceived learning (Rovai, 2002c, 2002d). More research, like that of Phirangee and Malec (2017), needs to look at how students who might differ from the majority are othered or alienated in their online courses and specifically different ways we can create more inclusive and equitable learning environments.

Theme 4: Religious differences

In keeping with his attempts to understand how various human characteristics impact feelings of community in distance learning environments, Rovai engaged in a couple of studies in which he sought to assess and compare the sense of community amongst students enrolled in online courses at a Christian university with those at a secular university (Rovai & Baker, 2004; Rovai et al., 2008). In both studies, Rovai found that the Christian students expressed a stronger sense of community than their peers at the secular university. He suggested that this could be because he thought Christian values lend themselves to a greater sense of community. We contend, though, that many others might come to a very different conclusion than Rovai on this.

Regardless, there were some notable limitations in these studies. The Christian university was composed of a comparatively more homogeneous population and was quite small with around 2,700 students, whereas the secular university was somewhat more diverse and had over 19,000 students (Rovai & Baker, 2004). Therefore, it is possible that the homogenous nature of the population (i.e., in this case, all Christian students) may have played a role in the students' perceptions of a sense of community, regardless of their specific religion or belief system. Likewise, as students at a small, private college, the participants may have been more likely to have taken or be taking other classes together outside of those selected for Rovai's study, possibly resulting in the students feeling a greater sense of community (outside the parameters set within the study). Further, it's likely that any homogenous group that already has some key things in common might feel a stronger sense of community before a course even starts. Finally, the distance courses were offered in two different formats, and therefore in many ways, it was comparing apples to oranges as the saying goes. Rovai did not appear to make any attempts to control for these potential influences within these reports.

Limitations and Gaps in Rovai's Work

Rovai is a pioneer in online learning research and his research is still regularly read, cited, and built on today. However, like all research, we contend that there are some inherent limitations with some of Rovai's research. These limitations may restrict the generalizability of the results of Rovai's work.

First, most of the participants in his research were graduate or undergraduate students in education and leadership courses. Participant groups were also commonly composed of 60-70% women and the majority were White (Rovai, 2002a; Rovai, 2002c; Rovai, 2003b; Rovai, 2004; Rovai & Baker, 2004; Rovai et al., 2004; Rovai & Whiting, 2005). This uneven distribution makes it difficult to generalize these experiences to other groups of students or settings. With only one study including students in a K-12 environment (Rovai et al., 2004), further studies are needed to examine how factors like a sense of classroom community impact perceived learning in compulsory education.

Additionally, several studies were conducted in a single school in Virginia with the same professor (Rovai & Baker, 2004; Rovai et al., 2008; Rovai & Gallien, 2008; Rovai & Ponton, 2005). The context in these studies makes it difficult to generalize to other populations, especially other cultures, or areas of the world. It is possible that some of the findings across studies could be attributed to the professor's teaching style and/or online presence rather than the inherent nature of the studies themselves, as other researchers have questioned in past research (Lowenthal & Trespalacios, 2022; Trespalacios & Lowenthal, 2019). Future research should include more experimental designs as well as replications with different instructors in different content areas at different institutions with different class sizes.

Most Rovai's studies also focused on online courses that solely used Blackboard and text-based asynchronous discussion boards as the primary if not sole means of student communication (Rovai, 2000; Rovai, 2001a; Rovai, 2001b; Rovai, 2001c; Rovai, 2002a; Rovai, 2002d; Rovai, 2003; Rovai, 2007). This is likely due to the limited communication tools available in the early 2000s. However, this may limit the results of these studies. Further, online platforms like YouTube and social networking websites have since advanced to allow the sharing of music, pictures, and videos. Research suggests that sharing personal items like these make it easier for online classmates to form connections by referencing media that are personally significant (Belt & Lowenthal, 2021, 2022; Dunlap & Lowenthal, 2010; Fiock, 2020; Woods &

Bliss, 2016). Rovai's studies are representative of an era where multimedia was limited and text-based discussions were the dominant, if not only, means of building community in an online classroom environment.

Rovai's research also focused primarily on individual courses rather than on a student's academic career, even though the drop-out rate was cited as a significant concern that Rovai hoped to address. His research primarily focused on a single course lasting only one semester. Thus, additional research is needed to know the long-term effects of a high or low sense of community students might sense in a program across multiple courses. Additionally, despite the importance he placed on course design and instructional methods, most of his work lacks a thorough description of the design of these courses. Finally, Rovai's research by and large focuses on self-reported or self-perceived learning. As Kanuka and Rourke (2009) once critiqued research on the Community of Inquiry, more research needs to look at the relationship between a sense of classroom community and actual student learning.

Extensions of Rovai's Work

Researchers have continued to build on and extend and at times even critique Rovai's work over the years though most of this has entailed using Classroom Community Scale (CCS). For instance, Dawson (2006) investigated how the CCS could be used as a formative tool to assess students' perceptions of classroom community. Dawson found by administering the CCS to 446 students across multiple courses that students with a higher frequency of communication interactions reported that they had a stronger sense of classroom community. Dawson concluded that the CSS could be used as a scalable and ongoing formative evaluative measure to guide the design and success of interventions used to create a stronger sense of community in future online courses.

Researchers have continued to investigate how other things influence perceptions of classroom community. For instance, Ni and Aust (2008) investigated the relationship between teacher verbal immediacy, sense of classroom community, and their effects on student satisfaction, perceived learning, and online discussion frequency in online courses. They administered a survey consisting of five scales to measure teacher verbal immediacy, sense of classroom community (using Rovai's CCS), course satisfaction, perceived learning, and posting frequency. They found that both teacher verbal immediacy and a sense of classroom community positively influenced student satisfaction and perceived learning. More specifically, they found classroom community was the strongest predictor of satisfaction and perceived learning and that students in people-oriented courses (e.g., Education) perceived greater teacher verbal immediacy and classroom community than students in task-oriented ones (e.g., Medicine), regardless of their gender. The association between sense of classroom community and perceived learning aligned with Rovai's finding that a higher sense of classroom community correlates with better cognitive learning. Ritter et al. (2010) later used the CCS to investigate if there was a difference in graduate students' perceptions of classroom community in person face-to-face, hybrid, or fully online educational leadership courses. They found like Rovai that a positive sense of classroom community can develop in fully online courses but that perceptions of community were statistically lower in online courses compared to face-to-face and hybrid. This led Ritter et al. to question the role in person face-to-face contact plays in developing a sense of classroom community. A few years later, Pollard et al. (2014) used the CCS to see if teaching presence, social presence, and instructor social presence predicted student perceptions of community. They surveyed 137 students in a School of Business. They found that social presence and instructor

social presence were significant predictors of community, but that teaching presence was not a predictor of community.

At the same time, there has been a series of studies focused on the psychometrics of the CCS. For instance, Barnard-Brak and Shiu (2010) investigated the psychometric properties of using the CCS in a blended learning environment. They administered the survey to 145 students taking a computer-based literacy general education college course. While their results indicated an acceptable level of the internal consistency of scores, supporting the reliability of the instrument, confirmatory factor analyses did not support the construct validity of the instrument which led the authors to question future use of the instrument. Ahmady et al. (2018), on the other hand, found different results. They administered the Persian version of the CCS to 215 post graduate students attending a medical school in Iran. Their results had high reliability and supported the CCS's underlying factor structure.

Others focused on creating a short-form version of the CSS. For instance, Cho and Demmans Epp (2019) conducted a series of studies on the reliability and construct validity to reduce the CSS to an eight-item scale called the Classroom Community Scale Short Form (CCS-SF). They administered versions of the CSS to 197 students completing a MOOC or graduate courses in education, information and library sciences, and nursing over a two-year period, which helped them identify which items to keep in the CCS-SF. They argue that the CCS-SF has better validity than the original CCS and therefore should be a better measure of classroom community. Then Tackett et al. (2023) used the CCS-SF investigate classroom community among undergraduate students taking introductory math and statics classes. Their results confirmed the two-factor structure of the CCS-SF, which led them to conclude that it is a valid measure of classroom community in remote, hybrid, and in-person courses.

Research like this illustrates both the importance of classroom community in online courses as well as the influence Rovai's work had and continues to have on researchers of online learning.

Conclusions

Rovai produced a significant number of studies over a relatively short time that has had a significant impact on research on online learning and classroom community. His influence and impact are undeniable and should be recognized. However, his work was limited in scope regarding participants' education level, geographic location, limited longevity, research methods, and assessments of learning. It is important that those building on his research or using it as a theoretical framework for their own research understand both the breadth but also limitations of his work. It is only through understanding this that others can truly honor Rovai's larger ideas and build upon them.

Further research is needed investigating classroom community outside of the realm of graduate studies in education. It is also vital for future research to investigate the relationship between classroom community and actual learning. While Rovai's work provides a framework for understanding classroom community, there is still much work to be done to understand how classroom community is related to improving academic outcomes.

Compliance with Ethical Standards

- Disclosure of potential conflicts of interest: No conflict of interest
- Research involving human participants and/or animals: University IRB approved
- Informed consent: Not applicable

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Appendix

List of Articles Reviewed

Year	Title	Type	Journal	Citations
2000	Building and sustaining community in asynchronous learning networks	Synthesis	<i>Internet and Higher Education</i>	336
2001	Building classroom community at a distance: A case study	Empirical	<i>Educational Technology Research and Development</i>	741
2001	Classroom community at a distance: A comparative analysis of two ALN-based university programs	Empirical	<i>Internet and Higher Education</i>	142
2001	Sense of classroom community index	Empirical	<i>SCCI Test Booklet</i>	18
2002	Building sense of community at a distance	Synthesis	<i>International Review of Research in Open and Distributed Learning</i>	2132
2002	Development of an instrument to measure classroom community	Empirical	<i>Internet and Higher Education</i>	1312
2002	Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks	Empirical	<i>Internet and Higher Education</i>	1269
2002	A preliminary look at the structural differences of higher education classroom communities in traditional and ALN courses	Empirical	<i>Journal of Asynchronous Learning Networks</i>	302
2003	The relationships of communicator style, personality-based learning style, and classroom community among online graduate students	Empirical	<i>Internet and Higher Education</i>	138
2003	Strategies for grading online discussions: Effects on discussions and classroom community in Internet-based university courses	Empirical	<i>Journal of Computing in Higher Education</i>	100
2003	Sense of community in a higher education television-based distance education program	Empirical	<i>Educational Technology Research and Development</i>	111
2003	In search of higher persistence rates in distance education online programs	Synthesis	<i>Internet and Higher Education</i>	1228
2003	A practical framework for evaluating online distance education programs	Synthesis	<i>Internet and Higher Education</i>	242
2004	Blended learning and sense of community: A comparative analysis with traditional and fully online graduate courses	Empirical	<i>International Review of Research in Open and Distributed Learning</i>	1709
2004	The classroom and school community inventory: Development, refinement, and validation of a self-report measure for educational research	Empirical	<i>Internet and Higher Education</i>	266
2004	Sense of community: A comparison of students attending Christian and secular universities in traditional and distance education programs	Empirical	<i>Christian Scholar's Review</i>	36
2004	A constructivist approach to online college learning	Synthesis	<i>Internet and Higher Education</i>	637
2005	Feelings of alienation and community among higher education students in a virtual classroom	Empirical	<i>Internet and Higher Education</i>	541
2005	Gender differences in online learning: Sense of community, perceived learning, and interpersonal interactions	Empirical	<i>Quarterly Review of Distance Education</i>	345

2005	An examination of sense of classroom community and learning among African American and Caucasian graduate students	Empirical	<i>Journal of Asynchronous Learning Networks</i>	94
2005	Learning and sense of community: A comparative analysis of African American and Caucasian online graduate students Screen reader support enabled.	Empirical	<i>Journal of Negro Education</i>	84
2005	School Climate: Sense of Classroom and School Communities in Online and On-Campus Higher Education Courses	Empirical	<i>Quarterly Review of Distance Education</i>	158
2007	Facilitating online discussions effectively	Synthesis	<i>Internet and Higher Education</i>	706
2007	On-line course effectiveness: An analysis of student interactions and perceptions of learning	Empirical	<i>Journal of Distance Education</i>	617
2007	The effect of computer-mediated communication on anonymous end-of-course teaching evaluations	Empirical	<i>International Journal on E-Learning</i>	15
2008	Distinguishing sense of community and motivation characteristics between online and traditional college students.	Empirical	<i>Quarterly Review of Distance Education</i>	211
2008	How Christianly is Christian distance higher education?	Empirical	<i>Christian Higher Education</i>	45