

Systematic Review of **TWO DECADES (1995 to 2014)** of research on **SYNCHRONOUS ONLINE LEARNING**

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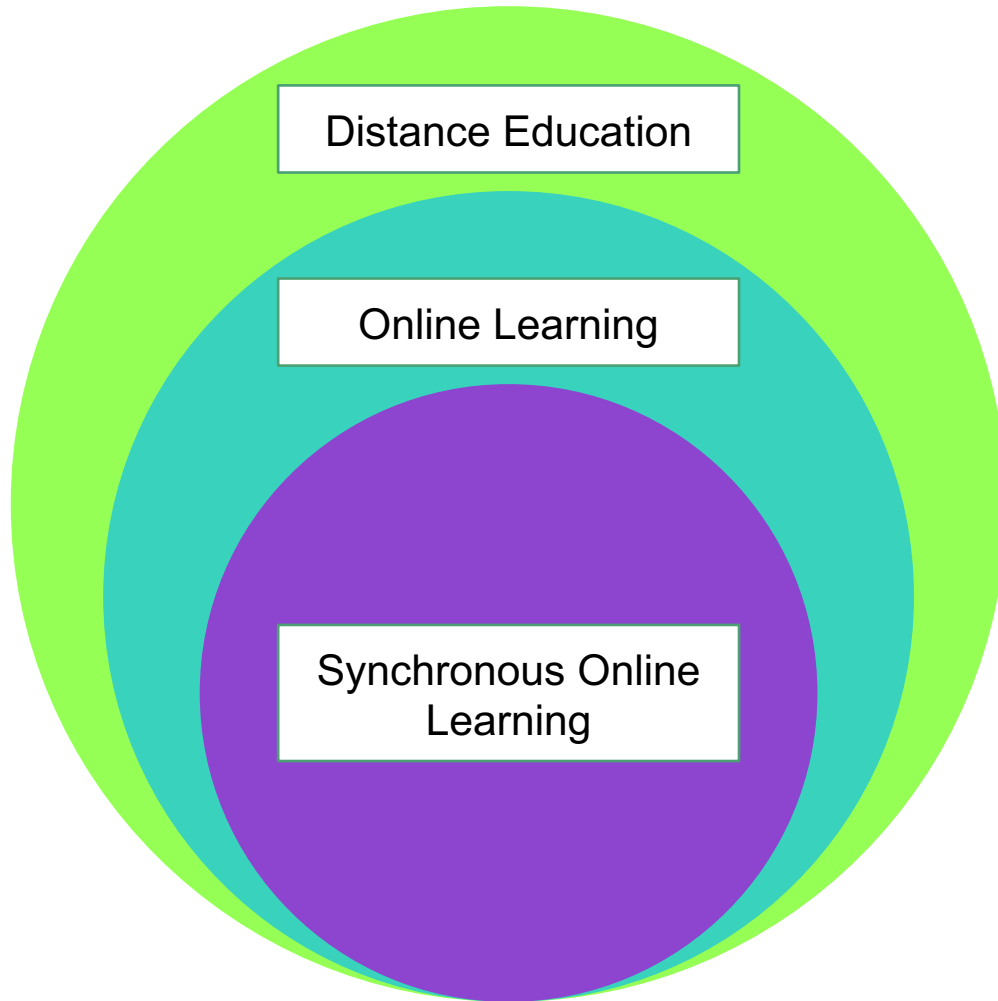
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Synchronous Online Learning Research Studies by Author

- [Martin, F., Ahlgrim-Delzell, L., Budhrani, K. \(2017\).](#) Two Decades (1995 to 2014) of Systematic Review of Research on Synchronous Online Learning. *American Journal of Distance Education*, 31(1), 3-19
- [Martin, F. & Parker, M.A. \(2014\).](#) Use of Synchronous Virtual Classrooms: Why, Who and How? *MERLOT Journal of Online Learning and Teaching*, 10, 2, 192-210.
- [Martin, F., Parker, M. & Allred, B. \(2013\).](#) A Case Study on the adoption and use of synchronous virtual classrooms, *Electronic journal of E-learning*, 11, 2, 124 - 128
- [Martin, F., Parker, M. A., Deale, D. \(2012\).](#) Examining the Interactivity of Synchronous Virtual Classrooms. *The International Review of Research in Open and Distance Learning*, 13, 3, 227-260
- [Roughton, C., Martin, F., Warren, J., & Gritmon, C. \(2011\).](#) Challenges in Synchronous Virtual Classrooms Adoption by Faculty, *International Journal of Instructional Technology and Distance Learning*, 8, 2, 45 - 54
- [Parker, M., & Martin, F. \(2010\).](#) Using Virtual Classrooms: Student Perceptions of Features and Characteristics in an Online and a Blended Course. *Journal of Online Learning and Teaching*, 6, 1, 135-147
- [Martin, F., & Noonan, D. \(2010, July\).](#) Synchronous Technologies for Online teaching. Proceeding of the International Conference on Technology for Education, Mumbai, India.
- [Martin, F. \(2010, July\).](#) Best Practices for Teaching in a Synchronous Virtual Classroom. Proceeding of the International Conference on Technology for Education, Mumbai, India.

Introduction



- This study systematically reviews the existing research on **synchronous online learning**.
- SOL occurs when the student and instructor are **together** in "real time" but not at the "same place."
- Adding synchronous components to online courses can **enrich meaningful interactions** between student-instructor and student-student (Repman, Zinskie & Carlson, 2005).

Working Definition of Synchronous Online Learning

A permanent separation (of place) of the learner and instructor during planned learning events where...

Instruction occurred in real time such that...

Students were able to communicate with other students and the instructor through text, audio, and/or video based communication of two-way media

which facilitated dialogue and interaction

Synchronous Online Learning Research

- Student perception
- Instructor perception
- Benefits of interaction and engagement

Synchronous Online Learning Research

- Student perception

- Positive attitude with synchronous technology (Aydin, 2008)
- Interaction opportunities (Lietzau, 2009)
- Positive achievement (Carbonara, King and Taylor, 2008)
- Student satisfaction (Somenarain, Akkaraju, and Gharbaran, 2010)
- Positive impact on motivation and on learning outcomes (Jauregi, 2008)
- Important elements - convenience, technical issues, pedagogical preferences (McBrien and Jones, 2009)

- Instructor perception

- Benefits of interaction and engagement

Synchronous Online Learning Research

- Student perception
- Instructor perception
 - 3 reasons why instructors were not using synchronous tools (Roughton Martin, Warren, and Gritmon, 2010):
 - **Lack the flexibility** that attracts students who want to attend class on their own time
 - **Lack the skills** and knowledge to use synchronous tools
 - **Synchronous meetings are not necessary** to teach course content
- Benefits of interaction and engagement

Synchronous Online Learning Research

- Student perception
- Instructor perception
- Benefits of interaction and engagement
 - **Interaction types** (student-teacher, student-student, student-content, and student-teacher) provide guidance on ways in which tools can be used for synchronous communication (Murphy and Coffin, 2003).
 - **Synchronous tools provide a structured approach to interaction** which enabled greater peer and teacher communication (Andrews et al., 2001)
 - **Student participation, teacher postings** and the quality of teacher moderating levels had a significant effect on student intellectual engagement (Shi, 2010).

Purpose and Research Questions

The Need for a Systematic Review

- This systematic review summarizes research on synchronous online learning from **1995 to 2014**
 - 1995 - Internet was commercialized in 1995 and had a drastic impact on education
 - 2014 - formed two decades of research
- Meta-analysis and systematic reviews have been conducted in distance education and online learning, but there are **no meta-analysis or systematic reviews that examine synchronous online learning.**

Research Questions

1. How many synchronous online learning articles were published between 1995 and 2014?
2. Which journals publish synchronous online learning research?
3. Which countries are represented in synchronous online learning research?
4. What are the instructional settings in which the synchronous technology was used?
5. What content areas are represented in the research articles on synchronous online learning?
6. What are the participant demographics for those who participate in synchronous online research?
7. What research designs are used in synchronous online learning research?
8. What are the synchronous online learning technologies that are used in these articles?
9. What are the independent variables used in the synchronous online learning articles?
10. What types of dependent measures are studied as part of research on synchronous online learning research?
11. What data collection tools are used in synchronous online learning research?

Method

Four-step systematic review process

(described in the U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse Procedures and Standards Handbook, Version 3.0, 2014)

1. Developing the review protocol
2. Identifying relevant literature
3. Screening and reviewing articles
4. Reporting findings

Data Sources

- Search
 - public literature from 1995 through December 2014
- Search Terms
 - “synchronous” and “online learning” using the “all text” search function
- Databases
 - WorldCat.org, ArticleFirst, ScienceDirect, Academic Search Complete, and ERIC
- Hand search
 - 20 instructional technology and distance education journals from 2013 and 2014

Included Articles

157 articles

The mean interrater
reliability: 89.1%

CODED ELEMENTS:

- Article Information
- Research Design
- Participant Demographics Context
- Type of synchronous online technology
- Independent variable (IV), if not the technology tool
- Dependent variable
- Data collection

Results, Implications, Recommendations

Results (157 articles): Journals

Top 4

1. Computers & Education (10.8%)
2. British Journal of Educational Technology (8.3%)
3. The International Review of Research in Open and Distributed Learning (8.3%)
4. Journal of Assisted Learning (7.0%)

-
- No published research articles on synchronous online learning **prior to 2000**
 - Most of the articles published after **2002**
 - **2012 PEAK** - the most published articles on synchronous online learning
-

Results (157 articles): Countries

34 countries represented

Country	F	%
United States	42	26.8
United Kingdom	18	11.5
Taiwan	15	9.6
Canada	11	7.0
Sweden	6	3.8

E-Readiness Rankings

(Economist Intelligence Unit, 2010)



Large U.S. Representation?

- Researchers use other terms
(virtual learning environments, virtual classroom, web conferencing)
- International studies are not in peer-reviewed journals

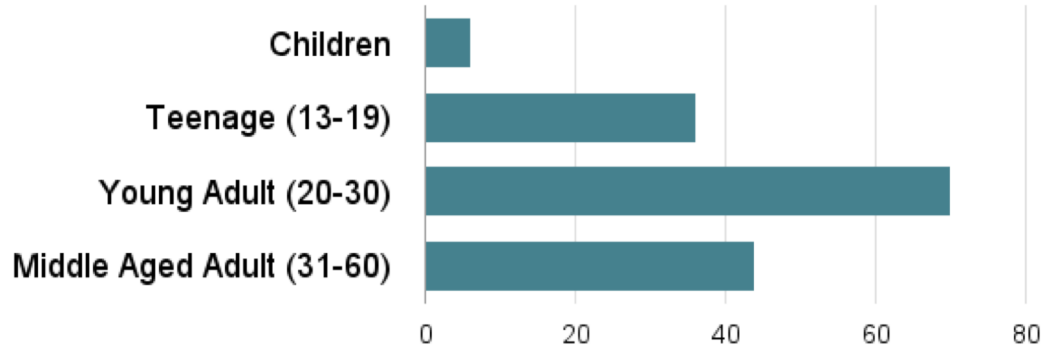
Results (157 articles): Instructional Setting and Content Area

Instructional Setting	F	%
Higher Education	108	68.8
K-12 schools	20	12.7
Business & Industry	4	2.5
Healthcare	2	1.3
Military	1	.6
Did not report	23	14.6

Content Area	F	%
English/Foreign Language	31	19.7
Education	30	19.1
Engineering/Computer Science /Information Technology	21	13.4
Science	12	7.6
Business	9	5.7
Medical/Health	7	4.5

Results (157 articles): Demographics

Age (reported by 51 articles)



Missing / Unclear Demographics

- Demographic information is not clearly reported
- While some **student demographics** reported, there was NONE reported on **faculty**
- No uniform understanding between **race, ethnicity and country**.
E.g. "Taiwanese"
 - Could refer to ethnicity and/or country

Results (157 articles): Research Design

43% Quantitative

57% Qualitative

- Qualitative studies are well suited for answering “how” or “why”
- Useful for new ideas, constructs, or developing theories when little is known about the topic
- Used to better understand the impact of synchronous online learning, its components, or the different synchronous tools on student learning and behavior

Results (157 articles): Synchronous Online Learning Tools

TOOLS

- Instant Messenger
- Elluminate
- Blackboard Collaborate
- WebCT Chat
- Adobe Connect
- JoinNet
- Horizon Wimba
- Skype



SYNCHRONOUS ONLINE STRATEGIES

- Synchronous chat
- Video conferencing

Implications

Provided a big picture of what
research has examined the past
two decades

Know more...

about **LEARNERS**

about **TOOLS**

about **RESEARCH**

about **OUR FIELD**

Recommendations

- Breakdown findings further into granular year segments.
- Explore dependent variables focusing on faculty or administrators to examine research trends beyond student perspectives.
- Explore variables on attitudes, participation, interaction and motivation in depth.
- Conduct meta-analysis or review from open access documents.

Limitations

1. Search term “synchronous online learning”
 - may have excluded research articles from other countries (e.g. web conferencing, synchronous virtual classrooms)
2. This study was a systematic review of online synchronous learning and not a meta-analysis.
 - A meta-analysis could provide additional information (e.g. effect of the independent variables in the context of synchronous online learning)
 - Includes only qualitative studies (which are much fewer)

Next Steps

Examining Quality

- Examining the quality of the articles published assists us in building knowledge, understanding the issues, and increasing confidence in generalizing findings to others
- The What Works Clearinghouse was established by the US Department of Education, Institute of Education Sciences (IES).

Research Question

To what extent does research on synchronous online learning meet quality research criteria on

- a. study design
- b. attrition
- c. outcome measures
- d. confounding factors

Quantitative Studies (n= 86)

- The sample was grouped into two categories, group experimental designs (n=47) and group non-experimental designs (n=39)
- Results indicate that 46.2% of experimental and 44.0% of nonexperimental studies meet the quality design standards.

Criteria	Experimental	Nonexperimental
Study Design	Participants randomized to groups Baseline equivalence	Must have one design: • Descriptive • Comparative • Simple correlation • Prediction • Multiple regression • Logistic regression • Expost facto • Causal-comparative
Attrition	No more than 20% overall or 7% differential attrition between the groups	No more than 20% overall

Criteria	Experimental	Nonexperimental
Outcome Measures	Must have all: • Evidence of face validity • Reports at least one reliability measure • Measures not overaligned with intervention • Data collected in the same manner for all groups	Must have all: • Evidence of face validity • Reports at least one reliability measure
Confounding Factors	Must not have any confounds: • Compares one unit to a different unit • Characteristics of units differ systematically • Provides multiple interventions separately in same study	Must not have any confounds: • Compares one unit to a different unit • Characteristics of units differ systematically • Presence of alternate variable associated with the dependent variable

From a different study on facilitation strategies - Mixed Findings

Instructors use of various features in synchronous sessions to interact with students ($M = 3.85$) as the lowest for instructor presence and instructor connection

Participant Reported - Helpful Facilitation Strategies - Instructor connection	Frequency	Percentage
Synchronous meetings	13	6.91
Question and Answer Sessions	4	2.13

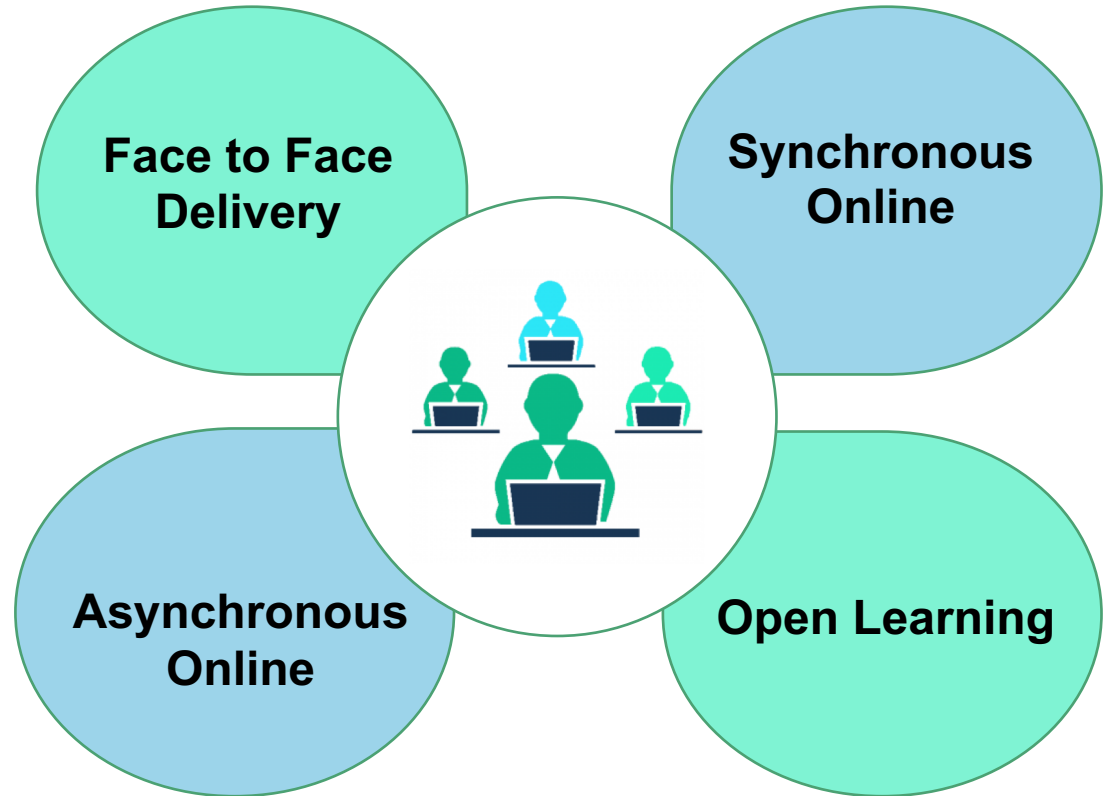
The Future of Synchronous...?

4-Tier Multi-Access Learning

(Irvine 2009, 2010)

Blended Synchronous Learning Environments (BSLE)

(Bower, Dalgarno,
Kennedy, Lee, &
Kenney, 2015)



Blended Synchronous Learning Environments (BSLE)

(Bower, Dalgarno, Kennedy, Lee, & Kenney, 2015)



Pedagogical, Social, and Technical Designs (Wang & Huang, 2018)

- Synchromodal Classes (Bell, Sawaya, & Cain, 2014)
- Multi-Access Learning (Irvine 2009, 2010)
- Multi-Sensory Learning (Sinclair, 2018)

Tools

- Virtual Presence (video conferencing, virtual reality, telepresence robots)
- Livestreaming & Interactive Video Conferencing
- Synchronous Video Classrooms

Learner Settings

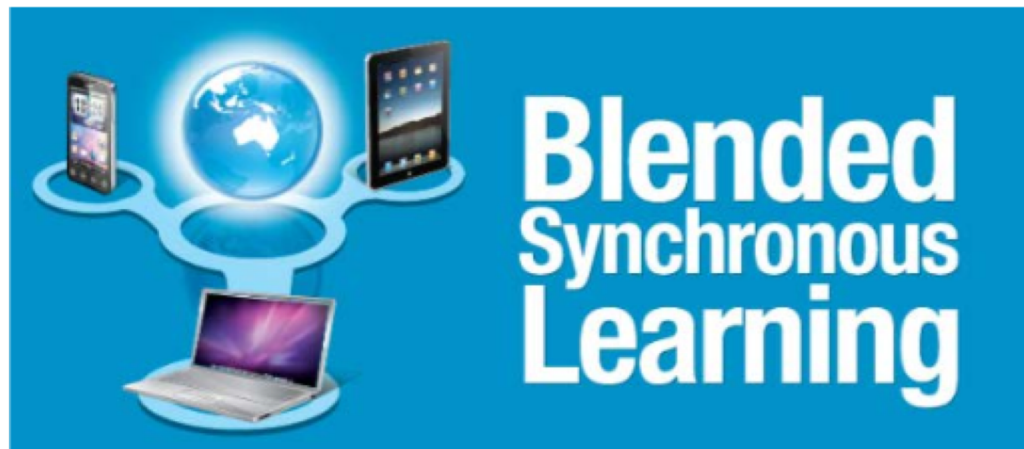
- Point-to-Point vs. Multipoint Connections
- Co-Located vs. Distributed Learners



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A Handbook for Educators

Matt Bower
Barney Dalgarno
Gregor Kennedy
Mark J. W. Lee
Jacqueline Kenney

<http://blendsync.org>

“

Uniting
on-campus and *distributed learners*
through

rich-media

real-time

synchronous tools

Thank you.

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