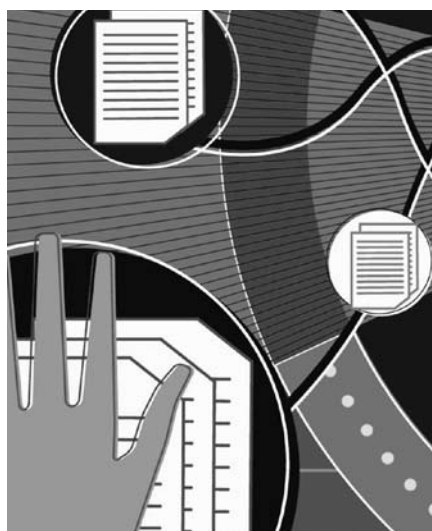


learners and with teachers, even when participants cannot be online at the same time. It is thus a key component of flexible e-learning. In fact, many people take online courses *because* of their asynchronous nature, combining education with work, family, and other commitments. Asynchronous e-learning makes it possible for learners to log on to an e-learning environment at any time and download documents or send messages to teachers or peers. Students may spend more time refining their contributions, which are generally considered more thoughtful compared to synchronous communication.⁷

Synchronous e-learning, commonly supported by media such as videoconferencing and chat, has the potential to support e-learners in the development of learning communities. Learners and teachers experience synchronous e-learning as more social and avoid frustration by asking and answering questions in real time.⁸ Synchronous sessions help e-learners feel like participants rather than isolates:

Isolation can be overcome by more continued contact, particularly synchronously, and by becoming aware of themselves as members of a community rather than as isolated individuals communicating with the computer.⁹

The debate about the benefits and limitations of asynchronous and synchronous e-learning seems to have left the initial stage, in which researchers tried to determine the medium that works “better”—such studies generally yielded no significant differences.¹⁰ Consequently, instead of trying to determine the best medium, the e-learning community needs an understanding of when, why, and how to use different types of e-learning. Note also that the users decide how to use a medium. For example, in some instances e-mail is used near-synchronously when users remain logged in and monitor their e-mail continuously.¹¹ Thus, the difference between asynchronous and synchronous e-learning is often a matter of degree.



Three Types of Communication

Haythornthwaite¹² argues that three types of communication in particular are important for building and sustaining e-learning communities: content-related communication, planning of tasks, and social support (see Table 1). Firstly, communication related to the course content is essential for learning. Just as in traditional education, e-learners need to be able to ask questions and share information and ideas. Secondly, support for planning tasks is essential, especially when learners produce some kind of product, such as an assignment, in collaboration with peers. Finally, social support relations are desirable for creating an atmosphere that fosters collaborative learning.

Research Background

In my PhD thesis,¹³ I compared asynchronous and synchronous e-learning. In this article, I focus on the analysis of asynchronous and synchronous online seminars held as part of two e-learning classes. The first class included 3 females and 5 males with a mean age of 38 years. The second class included 14 females and 5 males with a mean age of 43 years. Both classes studied knowledge management at the master’s level. Potential differences might arise because of the different group sizes (8 versus 19), but only a few such differences were evident in the data from this study.

To understand student opinions of asynchronous and synchronous e-learning, I also conducted 12 half-hour telephone interviews. Four of the interviewees were enrolled in the first class and eight were enrolled in the second class. The interviews, which I recorded and transcribed, were conducted within one month after the seminars concluded.

In the online seminars, I suggested questions for the class to discuss and also asked learners to submit questions about the course literature for discussion. The synchronous discussions were conducted by chat and scheduled for three hours. The asynchronous discussions used a discussion board and were scheduled over a week. I chose two asynchronous and two synchronous discussions from the middle of each course for further analysis. The classes used the

Table 1

Three Types of Communication*

Type of Exchange	Examples
Content-related	<ul style="list-style-type: none"> ■ Ask or answer a content-related question ■ Share information ■ Express an idea or thought
Planning of tasks	<ul style="list-style-type: none"> ■ Plan work, allocate tasks, coordinate joint efforts, or review drafts ■ Negotiate and resolve conflicts
Social support	<ul style="list-style-type: none"> ■ Express companionship, emotional support, or advice ■ Use emoticons (such as ☺, ☹) ■ Provide support when problems arise (such as when having technical difficulties) ■ Talk about things other than class work

* Adapted from Haythornthwaite.

same literature and the suggested questions were of similar character, designed to stimulate reflection and sharing of personal experiences relating to the literature in both the asynchronous and synchronous settings. After the online discussions concluded, I classified every written sentence according to the three types of exchanges described in Table 1. Some sentences included more than one type of exchange and were counted in more than one category.

The studies reported here were conducted in a specific context and with a small sample size. However, the key arguments are also supported by theory, as will become evident. I did not use learning outcome measures because only two pass/no pass grades were given in the courses, making it difficult to identify statistically significant differences given the small populations. Instead, this article relies on measures and perceptions of communication, which have been shown to have a positive effect on perceived learning, grades, and quality assessment of assignments.¹⁴

Benefits and Limitations of Asynchronous E-Learning

The classification of sentences from the seminar discussions is presented in Table 2. Almost every sentence in the asynchronous discussions of the smaller group, and a vast majority of sentences in the larger group, were classified as content-related. This is a remarkable result—imagine if learners on campus spent more than 90 percent of their time discussing issues related to course content. These results can also be interpreted as troublesome, however. If e-learners seldom meet face-to-face and teachers mainly rely on asynchronous



e-learning, students might feel isolated and not part of learning communities, which is essential for collaboration and learning.¹⁵ When comparing the smaller to the larger class, it seems difficult to get asynchronous discussions going with few participants, a finding supported by previous research.¹⁶

The cognitive model of media choice proposed by Robert and Dennis¹⁷ theorizes that asynchronous communication increases a person's ability to pro-

cess information. The receiver has more time to comprehend a message because an immediate answer is not expected. My interviews support this argument, as illustrated by the following quote:

In the [asynchronous discussions] it is easier to find some more facts, maybe have a look in a book and do more thorough postings.

In fact, according to Kock's estimate,¹⁸ an exchange of 600 words requires about 6 minutes for complex group tasks in face-to-face settings, while exchanging the same number of words over e-mail would take approximately one hour.

Benefits and Limitations of Synchronous e-Learning

When studying Table 2, it becomes apparent that synchronous e-learning supports other types of communication more often than does asynchronous e-learning. Almost 60 percent of the sentences related to content, while a third of the sentences related to planning of tasks. This can be explained by the fact that these discussions were limited by time—the participants had to make sure they did what was expected during the scheduled three hours. In synchronous discussions, participants also discussed things other than course work. This was especially evident at the beginning and end of each discussion. No apparent difference could be discerned in the synchronous discussions when comparing the smaller and larger classes.

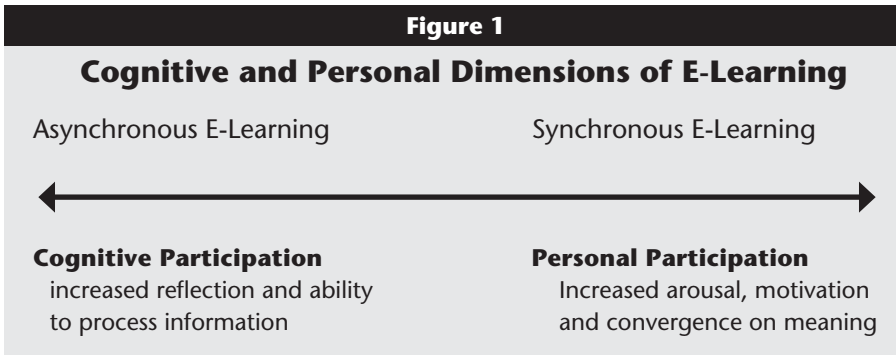
Kock's media naturalness hypothesis¹⁹ predicts that synchronous communication increases psychological arousal. Similarly, Robert and Dennis's²⁰ cognitive model of media choice predicts that

Table 2

Sentences Categorized by Type of Communication and E-Learning

Type of Communication	Smaller Class (n=8)		Larger Class (n=19)	
	Synchronous	Asynchronous	Synchronous	Asynchronous
Content-related	876 (58%)	369 (99%)	1,816 (57%)	2,438 (93%)
Planning of tasks	507 (34%)	5 (1%)	935 (29%)	131 (5%)
Social support	198 (13%)	2 (1%)	572 (18%)	124 (2%)
All sentences	1,507 (100%)	375 (100%)	3,173 (100%)	2,608 (100%)

Figure 1



synchronous communication increases motivation. Kock argues that each element that characterizes “natural” media (for example, the ability to convey and observe facial expressions and body language) contributes to psychological arousal. If these elements are suppressed, however, a decrease in psychological arousal can be expected.

The interviews revealed that many e-learners felt that synchronous communication was “more like talking” compared with asynchronous communication. It seemed more acceptable to exchange social support and discuss less “complex” issues. Consequently, the higher sentence counts when communicating synchronously (see Table 2) can be explained by the fact that the e-learners felt more psychologically aroused and motivated, since this type of communication more closely resem-

bles face-to-face communication. This finding was especially evident in the smaller class.

Synchronous communication enables monitoring the receiver’s reaction to a message, which makes the receiver more committed and motivated to read and answer the message.²¹ The interviews conducted as part of my empirical studies supported this argument:

Even if I cannot see the person, I write so to speak to the person directly and get an immediate answer.

It can also be expected that the sender becomes more psychologically aroused and motivated because he or she knows a response is likely. In synchronous e-learning, learners respond quickly because they do not want to disrupt the

conversation. A downside revealed in the interviews is that the focus is often on quantity rather than quality—that is, trying to write something quickly because “someone else will say what I was going to say.”

Cognitive and Personal Dimensions of E-Learning

In the previous section, I suggested that synchronous communication makes it possible to monitor the receiver’s reaction to a message, making the receiver feel more committed and motivated to read it. When communicating asynchronously, however, the receiver has more time to comprehend the message, since the sender does not expect an immediate answer. Thus, synchronous e-learning increases arousal and motivation, while asynchronous e-learning increases the ability to process information.

The concepts of *personal participation* and *cognitive participation* describe the dimensions of learning supported by asynchronous and synchronous e-learning (see Figure 1). Personal participation describes a more arousing type of participation appropriate for less complex information exchanges, including the planning of tasks and social support. Cognitive participation describes a more reflective type of participation appropri-

Table 3

When, Why, and How to Use Asynchronous vs. Synchronous E-Learning

	Asynchronous E-Learning	Synchronous E-Learning
When?	<ul style="list-style-type: none"> ■ Reflecting on complex issues ■ When synchronous meetings cannot be scheduled because of work, family, and other commitments 	<ul style="list-style-type: none"> ■ Discussing less complex issues ■ Getting acquainted ■ Planning tasks
Why?	<ul style="list-style-type: none"> ■ Students have more time to reflect because the sender does not expect an immediate answer. 	<ul style="list-style-type: none"> ■ Students become more committed and motivated because a quick response is expected.
How?	<ul style="list-style-type: none"> ■ Use asynchronous means such as e-mail, discussion boards, and blogs. 	<ul style="list-style-type: none"> ■ Use synchronous means such as videoconferencing, instant messaging and chat, and complement with face-to-face meetings.
Examples	<ul style="list-style-type: none"> ■ Students expected to reflect individually on course topics may be asked to maintain a blog. ■ Students expected to share reflections regarding course topics and critically assess their peers’ ideas may be asked to participate in online discussions on a discussion board. 	<ul style="list-style-type: none"> ■ Students expected to work in groups may be advised to use instant messaging as support for getting to know each other, exchanging ideas, and planning tasks. ■ A teacher who wants to present concepts from the literature in a simplified way might give an online lecture by videoconferencing.

ate for discussions of complex issues. I suggest that, other things being equal, synchronous e-learning better supports personal participation and asynchronous e-learning better supports cognitive participation.

The research discussed here demonstrates that asynchronous and synchronous e-learning complement each other. An implication for instructors is to provide several types of asynchronous and synchronous communication so that appropriate means are available for different learning activities. The combination of these two types of e-learning supports several ways for learners and teachers to exchange information, collaborate on work, and get to know each other.²² As stated earlier, many learners enroll in online courses because of their asynchronous nature, which needs to be taken into account. For the discussion of complex issues, synchronous e-learning, by media such as videoconferencing, instant messaging and chat, and arranging face-to-face meetings as a complement, may be essential as support for students to get to know each other and for planning the tasks at hand. However, when discussing complex issues, in which time for reflection is needed, it seems preferable to switch to asynchronous e-learning and use media such as e-mail, discussion boards, and blogs. Table 3 summarizes when, why, and how to use asynchronous versus synchronous e-learning.

Conclusion

The media investigated in this article have been key in transforming the focus on e-learners as individuals to e-learners as social participants. A parallel move has occurred toward Web 2.0, which emphasizes the increasing use of the web to support social relations. This shift will surely lead to new ways of collaborating in online education. Initial efforts include the adoption in educational settings of emerging media such as virtual worlds, blogs, wikis, and video sharing, and synchronous software that supports audio and video.

An essential challenge is to critically study the benefits and limitations of emerging types of asynchronous, syn-

chronous, and hybrid e-learning. This will facilitate understanding of the complex task ahead—taking advantage of emerging media in ways that benefit learning. *e*

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