Characterizing Digital Contexts of Collaborative Learning: An Updated Classification of Computer-Mediated Communication

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Abstract: The learning sciences is concerned with studying how learners interact with each other in technologically-mediated environments, but core similarities and differences among tools are rarely addressed, limiting our ability to build a collective knowledge base. To address the issue, we present a revised version of Herring's (2007) scheme for classifying technological contexts of communication, updated for current technologies and their uses.

The learning sciences has a long tradition of carefully documenting learner interactions in technologically-mediated environments, with patterns in communication connected to specific affordances of the tools and the ways they are taken up in the context of established or emergent practices. However, in attending to the particulars of design, we often lose sight of fundamental technological characteristics that play a role in shaping activity. Characterizing common aspects of tools can offer a language with which to discuss computer-mediated communication (CMC) across tools and contexts. Drawing on literature from communication, linguistics, informatics, and sociology, Herring (2007) presented a scheme for such classification (see Table 1a). No element is deterministic, but each describes a key characteristic that can influence the structure and substance of online talk. While Herring's scheme has been used extensively in other fields, there has been limited uptake in the learning sciences. At the same time, there have been dramatic changes in the technological capabilities of CMC and socio-cultural practices surrounding its use, creating a need to update the original elements. The revised scheme is shown in Table 1b. Some elements have merged with others, some were added in response to new technological capabilities, and some retained their name but changed greatly in the underlying description.

Table 1: (a) Original and (b) Updated Technological Characteristics of CMC Contexts

(a)

Original Technological Characteristics
Synchronicity
Message Transmission (1-way vs. 2-way)
Persistence of transcript
Channels of communication
Size of message buffer
Anonymous messaging
Message format
Private messaging
Quoting
Filtering

(b)

Updated Technological Characteristics	
Timing	Synchronicity Simultaneity Persistence
Messages	Communication Channels Message Size Storage Structure & Display Format
People	Identity Markers Community Markers
Controls	Privacy Filtering, Searching & Sorting

Timing. ***Synchronicity.*** Historically there was a clear line between systems intended for synchronous (same-time) and asynchronous (time-separated) use, but over the last decade there has been convergence of these modalities (Herring & Androutsopouluos, 2015). Traditionally synchronous tools (e.g. chat) now store messages to support asynchronous use, while the pervasiveness of internet connectivity supports synchronous use of traditionally asynchronous tools (e.g. email). In large groups, latency in message creation, receipt and reply can differ across individuals as well. Synchronicity is now thus best considered as a continuum and one which depends both on the technology and how it is used. Differences in synchronicity have effects on reply latency, message length, formality and complexity. ***Simultaneity.*** Previously discussed as one- versus two-way transmission, the broader concept of simultaneity refers to the technical possibility for overlap in communication. Systems that support near-simultaneity require a comment to be composed in its entirety before it is transmitted to others. The system may or may not provide an indicator the composition is occurring (e.g. "Jo is typing"). In contrast, systems that support high-simultaneity transmit messages as they are composed on a character-by-character basis, allowing for interruption and overlapping talk. The degree of simultaneity possible and indicators of message composition influence turn-taking, interruptions and how comments are interleaved. ***Persistence.*** Persistence describes how many messages remain stored in a system for how long. Traditionally asynchronous media have effectively everlasting persistence. Traditionally synchronous mediums were in part used this way because the length of the transcript retained was limited, with new comments replacing the old

(Herring, 2007). However, as described above, persistent transcripts have now become a feature of formerly synchronous tools leading to their hybrid use. At the same time, some tools (e.g. SnapChat) have made time-limited persistence (intentional ephemerality) a feature by deliberately capping the duration for which a message is stored. The anticipation (or absence) of persistence has implications for what learners will say to each other.

Messages. ***Communication Channels.*** While CMC tools traditionally used text as the primary communication channel, visual and audio channels are often now supported, and in some cases designated as preferred (e.g. Instagram). Traditional analysis has focused primarily on textual communication, but the increased use of alternate channels requires incorporation of new analysis techniques, for example methods for analyzing visual communication. Many CMC tools also include additional communication channels via the application of pre-determined or user-generated tags (e.g. "likes" "up-votes" "#greatpoint). When available, such tags can take the place of messages that would have been written, thus need to be considered as such in analysis. ***Message Size.*** Allowed message size typically refers to an explicit restriction on the number of characters in the textual portion of a message. While many CMC systems are effectively without cap, other tools are strongly constrained, for example Twitter's well-known character limit. Textual content embedded in images can also be implicitly limited due to restrictions on image size and the need for readability. Limits on allowed message size can lead to the use of abbreviations and particular discourse strategies. Tools can also tie display properties to message length, thereby affecting their use; for example Facebook currently "amplifies" (shows in large colored text) posts of 85 characters or less. ***Storage Structure & Display Format.*** Storage structure refers to relationship(s) between messages, while display format indicates the way in which messages and these relationships are presented to learners. Storage structures can be single stream, threaded, or networked and constrains, but does not determine message display (e.g. chat tools add new contributions to the bottom of a list while blogs place newest entries at the top). In addition, organization of thread display by topic or by para-content (e.g. views, up-votes and likes) can influence what messages are read and replied to. This is important to consider when making claims about the construction, popularity or importance of particular portions of online talk.

People. ***Identity Markers.*** Some CMC systems allow learners to mask their identity when sending messages either by not logging in (true anonymity) or while logged in (system-protected anonymity). This can support self-disclosure and/or anti-social behavior (Herring, 2007). A variant is the use of pseudonyms through systems that allow (or require) learners to select a handle different from their name. Pseudonyms support continuity across messages, providing support for identity play. At the other end of the spectrum, systems such as Facebook attempt to limit users to a single account that is tightly tied to their real world identity. Such systems can force learners to reconcile different aspects of themselves, either through accepting the mingling, regulating their disclosure, or through careful use of privacy controls. ***Community Markers.*** The rise and evolution of social networking has brought about new sets of features with affordances for activity that can play a role in online talk (Herring & Androutsopouluos, 2015). These include establishing linkages between messages or user accounts (e.g. two-way "friends" or one-way "followers"). Traversing such connections makes it more likely that learners will encounter messages shared by certain people, thus affecting how online talk proceeds and making it difficult to claim that people have innate (rather than induced) affinity for certain kinds of content.

Controls. ***Privacy.*** Early CMC tools included the basic ability to send messages publicly or privately. Recent tools offer complex systems of privacy controls for "public" messages (e.g. share comments only with those in your network or segmented subpopulations of this). This can lead different streams of talk to have distinct, limited groups of potential participants and result in participants each seeing a different, partial, version of a conversation. This splintering of experience impacts inferences that can be drawn about a conversation existing as "shared" among a group. ***Filtering, Searching & Sorting.*** Complementary to privacy controls by message authors, these tools give learners control over what messages from others they see. Current systems offer a wide variety of options for message inclusion, including searching by learner or keyword. Sorting can also be done based on timing or learner-created para-data (e.g. "likes"). Application of hashtags to denote thematically related content provides an additional (privileged) vocabulary for filtering. Together these tools can create amalgamations of messages that are read by learners as in relation to each other even if not created in this way.

References

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