Taxonomy of Online Media: Integrating Andragogy, Transformative Learning, and Media Synchronicity Theory to Improve Learning

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Online media has become a significant tool for educating adults. This work proposes taxonomy for digital media used in online education to improve learning. The online media taxonomy (OMT) provides a method of classifying media using the dimensions proposed by Media Synchronicity Theory (MST) in the context of a learner-centered education that is based on Andragogy Theory and Transformative Learning Theory (TLT). Classification of media using the OMT indicates that media may be more effective when OMT, Andragogy and TLT enhance educators’ media choice.

Introduction

In the current global economic downturn, people and societies are in crisis. A series of economic, political, and social crises have resulted in personal loss and makes past thinking about critical competencies (knowledge, understanding, skills, attitudes, values, and interests required to adapt) obsolete. As a result, there is a growing demand for adult education, especially online. In response, learning systems such as Blackboard have emerged, offering an organizing structure interface that seems educator-centered instead of student-centered. In 2009, online learners represented 25.3% of all post secondary enrollment (Allen & Seaman, 2010); a growth of 17% from 2008. The media used for online education varies widely in the degree of synchronicity (real time communication), which directly effects social interaction, “rehearsability (the ability to fine tune a message before sending it)”, and “reprocessability (the ability to retrieve and process again a received message for better understanding/reference)” (Dennis, Fuller, & Valacich, 2010, p. 2). Media differs in its ability to use various “symbol sets (the different ways a message can be encoded)”, “parallelism (the number of transmissions that can take place simultaneously)”, and “transmission velocity (how fast a message can reach the recipient)”. Mezirow (1981) argued, “an ideal set of conditions for participation in critical discourse is implicit in the very nature of human communication” (p. 198). The media chosen for online education affects the communication performance, which affects the learning performance.

The research question was, how could media most effectively support online learning? The sub-question was, can andragogy theory, transformative learning theory, and media synchronicity theory give guidance to and support taxonomy that will allow the educator to make better online media choices to improve learning? This work proposes taxonomy for online media used in a learning environment. Taxonomy is a method of arrangement or classification (Harper, 2010). Online learning media is digital media that is created and displayed using computer technology for the purpose of learning. All online media can be used in education, so no effort is made to exclude any type of online media from the taxonomy. The purpose of the taxonomy is to provide a method of classification that will allow easy recognition of the media properties when used for education. The framework is based on Andragogy Theory (Henschke, 1998; Knowles, 1973), Transformative Learning Theory (TLT) (Mezirow, 1997), and Media Synchronicity Theory (MST) (Dennis, Fuller, & Valacich, 2008). The Online Media Taxonomy (OMT) uses
the principles proposed in all three theories as a basis for the classification of online media. The next section discusses the theoretical basis for the taxonomy.

**Relevant Literature**

**Andragogy Theory**

In andragogy theory, the assumptions about adult learners are increasing self-directedness, learners’ experience is a rich resource for learning, learning readiness is related to developmental tasks of social roles, immediacy of application, and problem-centeredness (Knowles, 1973). Self-directedness is the centerpiece of andragogy. It is “both the means and the end of education” (Mezirow, 1981, p. 20). It is the job of educators to help learners learn, so they become self-directed. The terms autonomous and self-directed may seem synonymous but are not necessarily synonymous in learning. A learner’s autonomy is situational; because a learner has been self-directed in one content area does not mean he will be in another, which emphasizes the importance of educator orientation, guidance, support, and media selection in learning projects whether face-to-face (FtF) or online (Candy, 1991).

There are eight andragogical principles of practice used to create an online model. Sequentially, they are preparing the learner, establishing a physical and psychological environmental, having a mechanism for mutual planning, involving the learners in diagnosing their own learning needs, formulating their own program objectives, designing their own learning plans, helping the learners carry out their own learning plans, and involving the learners in evaluating their learning (Knowles, 1995). The first two principles establish trust without which learning is at risk (Henschke, 1998). The educator that follows these principles is positioned as a facilitator of learning.

**Transformative Learning Theory**

Transformative learning (Mezirow, 1997) results from a significant event in the learner’s experience. The event conflicts with the learner’s frame of reference. The frame of reference is formed from experience, education, beliefs, feelings, and the individual’s self-definition. It provides a structure for the learner and a reference for ongoing events. The disconcerting event challenges the learner’s frame of reference, which defines the learner’s problem space and subsequent solution space (Simon, 1981). When a solution to problems cannot be found, a crisis has demonstrated that the learner’s problem space is ill defined and that the frame of reference is incorrect. The learner rejects the new information or reflects on the event and examines, re-evaluates, and transforms the frame of reference to allow for the event. The revised frame of reference is more flexible, adaptive, and discriminating. Transformative learning theory addresses the dynamics of the learner’s perspective transformation as a ten-step process (Mezirow, 1981). The first five steps involve learners recognizing that there is a dichotomy between their frame of reference and external events, and deciding to reconcile the two. The second five steps involve learners taking charge of their education and change of perspective. Transformative learning in an educational environment (Cranton & English, 2009) can happen inside or outside the classroom, because it is less about how the educators teach and more about they think about teaching and learning. To foster transformative learning, the educator must support critical reflection and questioning among the learners.
**Media Synchronicity Theory**

Media Synchronicity Theory (MST) (Dennis et al., 2008) proposes that media has dimensions that support the communication process. The communication process has two parts: first, information is transferred from the sender to the receiver; and then, they converge on a common understanding or knowledge. The convergence requires that both the sender and receiver apply the knowledge and reach the same conclusion. The physical capabilities of media are defined by MST through their adoption and use, and affect how the individual can transmit and process information. The communication media capabilities affect the efficiency and performance of the information conveyance and convergence. Media capabilities are defined by MST on five dimensions: transmission velocity (how fast a message can reach the recipient), parallelism (the number of transmissions that can take place simultaneously), symbol sets (the different ways a message can be represented), rehearsability (the ability to fine tune a message before sending it), and reprocessability (the ability to retrieve and process again a received message for better understanding/reference). To these five dimensions, a sixth dimension was added to adequately express synchronicity (Glancy & Isenberg, 2011). This dimension is reciprocity (the time between the sending of a message and the sending of a response). Transmission velocity provides a dimension of how fast the message gets to the receiver, and reciprocity provides a dimension that expresses how fast the receiver responds to the sender.

Conveyance and convergence have different requirements. Conveyance requires many different media to maximize reprocessability, symbol sets, and rehearsability. It may require a high degree of parallelism to allow for multiple simultaneous inputs. To assimilate the information, the receiver needs time, retrospection, and deliberation. This process requires reprocessability and may be aided by multiple symbol sets. Convergence may require verification, modification, and negotiation. The media supporting convergence may require reciprocity, parallelism, and high transmission velocity. Convergence often can be improved by increased symbol sets, reprocessability, and rehearsability. The speed of convergence is directly affected by the reciprocity.

**Methodology**

Existing media such as email, text messaging, asynchronous and synchronous discussions were examined for common elements as defined by media synchronicity theory (Dennis et al., 2008). Both the design stance and the intentional stance were considered (Dennett, 1989). First, the media was examined to determine what it was intended to do, its attributes, and how the media characteristics relate to andragogy, transformative learning, and media synchronicity theories. Second, the intentional stance of the media was examined to determine what the media should do; the attributes it should possess; how the drawbacks and attributes relate to andragogy, transformative learning, and media synchronicity theories; why media effects learning; and, how the effects can be defined. The major groups of the taxonomy were formed, and then divided into sub-categories. After development of the taxonomy, existing media were evaluated.

**Online Media Taxonomy Development**

Andragogy theory and TLT define the requirements the learner and educator place on the media to ensure the ability to think critically and create new meaning. The media dimensions are defined by MST. The effectiveness of the media is a function of the content, the learner, and the
learning process. Good teaching is dependent on knowing the principles of practice; one’s self, the learner, the content, and the methods (Galbraith, 2004). The principles of practice that are used to create the OMT are andragogy and TLT. The OMT is different from most taxonomies; most taxonomies are binary and make a classification based on if the item either has an attribute or does not have the attribute. The OMT is based on media performance. Online media has a range of dimensions. When examining the dimension of symbol sets, an email could support several different symbol sets such as text, mathematical symbols, and still pictures (Dennis et al., 2008). It could also support video and audio if both the sender and receiver’s email Internet service provider (ISP) supports these symbol sets. The email that supports video and audio has a greater degree of symbol sets than the one that only supports text. This requires the evaluation of media for classification within context; the context in this example is the actual ISP that is being used for education. The dimension must be assumed to be at the lowest level for all students when media is being selected, because some of the students’ ISPs support only text in email.

The dimensions used for classification are rehearsability, reprocessability, symbol sets, parallelism, transmission velocity, and reciprocity. The dimension measurement is relative to other media. An arbitrary 10-point scale is recommended for measuring each dimension of a media. Existing media were examined to illustrate how the taxonomy could be used (see Table 1). As a baseline, FtF learning in a traditional classroom without media support was examined. The FtF learning has limited symbol sets because it is limited to what the educator says or can write on a black board. It has limited reprocessability—limited to the notes the students take or the course textbook. The educator has a high level of rehearsability for the lecture, but has limited rehearsability for any questions the students raise. There is no parallelism because the class is limited to a single educator. The transmission velocity is fixed at the rate the educator can speak and write. The reciprocity is limited to the students’ ability to ask questions and receive feedback as the lesson progresses. In most traditional classrooms, there can be little to no questioning and feedback, and the educator can have little ability to generate questions.

The dimensions of video conferencing are similar to the FtF classroom unless it is recorded. When it is recorded and made available for all students, the reprocessability is high. There is still no rehearsability for the students to develop questions or for the educator to respond. The symbol sets are limited unless the video is combined with other media. The transmission velocity is fixed and there is only a single level of parallelism. The reciprocity is limited to the student/educator interchange made at the time of the videoconference. By contrast, an online threaded asynchronous discussion has high reprocessability and high rehearsability. The posting on the discussion can be developed fully before submitting and even edited by the poster after submitting it. Each learner can review the post multiple times after the posting. The threaded discussion is limited to a single channel, but has the ability to reach many individuals simultaneously; and therefore, it has a medium level of parallelism. The threaded discussion is not limited to a single point in time as is a videoconference or a FtF classroom. This gives it a higher degree of reciprocity. The student can ask a question when he/she thinks of it and can expect an answer. Thus, it is important to leave all threaded discussions visible and accessible throughout the online course so learners can always go back at a later time. The time it takes for a student to receive the answer is dependent on the educator or, alternatively, another student can answer it. The student also has the opportunity to ask a question of a group outside of the formal class such as a special interest group or community of practice. Students have the opportunity to bring responses from the outside group to the educational framework. Table 1 assigns a relative rating for several online media on the six dimensions. They are rated from the student
perspective. It is possible to give the dimensions a different rating from the educator perspective; but because andragogical theory directs that adult learners are self-directed, this perspective was not considered.

Table 1: Media and Dimensions

<table>
<thead>
<tr>
<th>Media/Taxonomy</th>
<th>Rehearsability</th>
<th>Reprocessability</th>
<th>Symbol Sets</th>
<th>Transmission Velocity</th>
<th>Parallelism</th>
<th>Reciprocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>FtF Classroom</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Video conference for information</td>
<td>1</td>
<td>8</td>
<td>2</td>
<td>7</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Video conference for convergence</td>
<td>1</td>
<td>8</td>
<td>2</td>
<td>7</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Threaded Discussion</td>
<td>8</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>E-mail</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Texting</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Instant Messaging</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Internet Search</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Electronic Presentation</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Media selection depends on the purpose. It is not necessary to restrict the selection to one type of media. If multiple symbol sets and high reciprocity are required it is possible to combine video conferencing with presentation media. The electronic presentation media allows for embedding multiple symbol sets including audio and video. This gives the high symbol sets and a media that allows high reciprocity. The selection of media is limited only by the student’s and the facilitator’s creativity. The considerations for selecting the media extend to the ever advancing hardware and digital device selections.

Conclusions

The main research question was, how can media most effectively support online learning? Media may most effectively support online learning when online educator choice of media is enhanced by an OMT that rates the performance of media dimensions. The sub-question was, can andragogy theory, transformative theory, and media synchronicity theory give guidance to and support a taxonomy that will allow the educator to make better online media choices to improve learning? Yes, with a caveat. Because the OMT is not binary, it does not rule in or out a media choice, rather its performance ratings offer more information to educators of adults who are already expert in the knowledge and practice of andragogy and transformative learning theories in designing online learning.

An educator might intuit that media with high numbers on the taxonomy are the best choice when designing an online learning experience. Rather, educators should seek media that align with the phase of the learning process. To make skillful use of the OMT as it was intended, educators must be educated in andragogy and transformative learning theories and experienced in the practice of them. The OMT has the potential to assist enlightened educators of adults to participate in designing their educational experiences to optimize the media effects rather than
guessing what media to use when. Future work will develop recommendations for media selection for online education based on the OMT, Andragogical theory, and TLT.

References


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Presented at the Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education, Lindenwood University, St. Charles, MO, September 21 - 23, 2011