

**Creating Chat Connections: E-evaluating Virtual Reference Transcripts**  
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Virtual reference services (VRS) generate transcripts which provide fascinating mirrors of practice. In-depth analysis of an international sample of live chat transcripts allows researchers and practitioners to unobtrusively capture the nuances of reference practice previously unavailable in face-to-face settings. This study reports results from a grant supported by IMLS, Rutgers University, and OCLC Online Computer Library Center, Inc. Thirty to fifty chat transcripts per month were randomly selected from OCLC's QuestionPoint service during a twenty-four month period, resulting in a total sample of 850 transcripts from a population of 500,000+. Transcripts were stripped of identifying information (e.g., name, email address, IP address, location) and underwent six separate analyses:

- Geographical Distribution of library/consortium 1) receiving, and 2) answering the reference query
- Type of Library/Consortium
- Type of Query [using Katz (1997)/Kaske-Arnold (2002)/Radford (2006a) Category Schemes]
- Subject of Query (using *Dewey Decimal Classification*)
- Session Duration
- Interpersonal Communication Aspects (using the Radford Chat Reference Category Scheme for Relational Dimensions ©2006)

Qualitative analysis of interpersonal communication aspects of VRS interactions involved identification, comparison, and categorization of themes using NVivo software. Categories and coding method were developed in a previous study (see Radford, 1999) and applied to VRS in prior research (Radford 2006a, 2006b). Theoretical frameworks of Watzlawick, Beavin, and Jackson (1967) and Goffman (1967) informed category development. Analysis investigated differences in the interpersonal communication behaviors among different age groups, including 12-18 year-olds, the youngest members of the Millennial Generation (Sweeney, 2006), older Millennials, and adults. Teen Millennials have been called "screenagers" (Rushkoff, 1996) due to their immersion in digital technologies.

146 users were identified as screenagers and 226 as "others" (college age, or adults). The remaining VRS users' age could not be determined. Behaviors were coded using the Radford Chat Reference Category Scheme for Relational Dimensions (see below, and see Radford, 2006a, 2006b). Analysis found differences in the occurrence of facilitators (positive behaviors that enhance communication) and barriers (negative behaviors that impede communication) for the screenagers when compared to "others". Screenagers exhibited these facilitators more frequently than others: using alphanumeric short-cuts, doing repair and self-correction, and using alternate spelling of single words and slang expressions. Teens more frequently exhibited these barrier behaviors: being impatient, rude, or insulting. Screenagers used inappropriate language and were goofing around with greater frequency than others. Librarians more frequently exhibited these facilitators to the teens: seeking reassurance, using alternate spellings, demonstrating familiarity, asking them to be patient, using ellipsis (to indicate more...), and inviting them to return to the chat service. Librarians more frequently exhibited these facilitators toward others: encouraging remarks or praise, offering personal opinion/advice, explaining search strategy, explaining technical problems, suggesting strategy, offering to continue searching, making sure user has no more questions, and closing rituals. Librarians more frequently had barrier behaviors towards screenagers: reprimanding, limiting time, failing/refusing to provide information, ending abruptly, and sending them to Google. Towards others, the librarians more frequently had these barrier behaviors: ignoring self-disclosure and being disconfirming.

Results suggest that much can be learned about the screenagers and librarian's behaviors toward them by close examination of their behavior in chat reference transcripts, building on previous research in this area (e.g., see Agosto & Hughes-Hassell, 2005, 2006; Lippincott, 2005; Walter & Mediavilla, 2005). These findings have numerous implications for practice, including development of best practice guidelines for chat reference and suggesting important areas for training of VRS librarians, especially in academic environments. In other phases of the Seeking Synchronicity grant project, focus group interviews with VRS users, non-users, and librarians have been completed (see Connaway & Radford, 2007, Radford & Connaway, 2007). Online surveys and telephone interviews with these three groups are in progress and nearing completion and will provide additional insights into this rapidly evolving area of research.

**PowerPoint slides for the presentation are available at the Seeking Synchronicity web site:**  
<http://www.oclc.org/research/projects/synchronicity/>

**Results Comparing Relational Facilitators and Barriers  
of Screenager VRS Users, College to Older Adult Users, and Librarians Employing the  
Radford Chat Reference Category Scheme for Relational Dimensions ©2006**

	Screenagers to Librarians N=146	Librarians to Screenagers N=146	Librarians to Others* N=226	Others to Librarians N=226
<b>FACILITATORS</b>				
<b>Greeting Ritual</b>	33 (23%)**	76 (52%)	108 (48%)	68 (30%)
<b>Rapport Building</b>				
Seeking reassurance, confirmation, self-disclosure	57 (39%)	89 (61%)	115 (51%)	111 (49%)
Interjections	20 (14%)	11 (8%)	20 (9%)	38 (17%)
Offering confirmation	11 (8%)	7 (5%)	11 (5%)	18 (8%)
Inclusion	2 (1%)	48 (33%)	76 (34%)	6 (3%)
Approval	5 (3%)	3 (2%)	3 (1%)	14 (6%)
Empathy	4 (3%)	5 (3%)	5 (2%)	8 (4%)
Offering reassurance	16 (11%)	38 (26%)	56 (25%)	36 (16%)
Encouraging remarks praise	4 (3%)	18 (12%)	39 (17%)	13 (6%)
Enthusiastic remarks	2 (1%)	5 (3%)	4 (2%)	7 (3%)
Informal language	13 (9%)	8 (5%)	9 (4%)	21 (9%)
Alternate spelling abbreviated single words	41 (28%)	20 (14%)	28 (12%)	60 (27%)
Slang expressions	16 (11%)	2 (1%)	9 (4%)	21 (9%)
All lower case	43 (29%)	5 (3%)	16 (7%)	71 (31%)
Repair, self-correction	18 (12%)	5 (3%)	13 (6%)	25 (11%)
Humor	3 (2%)	0 (0%)	1 (0%)	6 (3%)
Self disclosure	61 (42%)	8 (5%)	17 (8%)	125 (55%)
Offering personal opinion, advice, value judgment	4 (3%)	43 (29%)	83 (37%)	10 (4%)
Admitting lack of knowledge or being at a loss as to where to search	13 (9%)	16 (11%)	31 (14%)	47 (21%)
Explaining search strategy	1 (1%)	9 (6%)	31 (14%)	6 (3%)
Explaining technical problems	5 (3%)	14 (10%)	26 (12%)	21 (9%)
Familiarity	1 (1%)	4 (3%)	2 (1%)	1 (0%)
Acknowledging humor	0 (0%)	1 (1%)	4 (2%)	0 (0%)
<b>Deference</b>				
Polite expressions	31 (21%)	83 (57%)	127 (56%)	61 (27%)
Thanks	75 (51%)	32 (22%)	51 (23%)	175 (77%)
Apology	10 (7%)	16 (11%)	28 (12%)	20 (9%)
Self-deprecating remarks	4 (3%)	2 (1%)	1 (0%)	10 (4%)
Asking for other to be patient	6 (4%)	57 (39%)	80 (35%)	9 (4%)
Agreement to try what is suggested or to wait	46 (32%)	2 (1%)	1 (0%)	116 (51%)
Suggesting strategy or explanation in tentative way	6 (4%)	12 (8%)	25 (11%)	8 (4%)
Praise, admiration	6 (4%)	0 (0%)	1 (0%)	13 (6%)
Expressions of enthusiasm	7 (5%)	4 (3%)	10 (4%)	16 (7%)

	Screenagers to Librarians N=146	Librarians to Screenagers N=146	Librarians to Others* N=226	Others to Librarians N=226
<b>Rerepresentation of Nonverbal Cues</b>				
Ellipsis	24 (16%)	43 (29%)	59 (26%)	48 (21%)
Punctuation/repeated for emphasis	30 (21%)	22 (15%)	38 (17%)	53 (23%)
Phrase abbreviations	6 (4%)	0 (0%)	3 (1%)	8 (4%)
Emoticons	7 (5%)	5 (3%)	8 (4%)	13 (6%)
Spells out nonverbal behaviors	3 (2%)	1 (1%)	1 (0%)	4 (2%)
All CAPS	13 (9%)	4 (3%)	11 (5%)	18 (8%)
Alpha-numeric shortcuts	5 (3%)	0 (0%)	2 (1%)	5 (2%)
Asterisk, other symbol for emphasis	7 (5%)	1 (1%)	4 (2%)	8 (4%)
<b>Closing Ritual</b>	47 (32%)	31 (21%)	62 (27%)	111 (49%)
Invites to return if necessary	1 (1%)	21 (14%)	25 (11%)	1 (0%)
Makes sure user has no more questions	0 (0%)	27 (18%)	45 (20%)	1 (0%)
Offers to continue searching & e-mail answer	0 (0%)	7 (5%)	24 (11%)	0 (0%)
Explanation of signing off abruptly	8 (5%)	8 (5%)	2 (1%)	12 (5%)
<b>BARRIERS</b>				
<b>Relational Disconnect, Failure to Build Rapport</b>				
Robotic answer	0 (0%)	0 (0%)	3 (1%)	0 (0%)
Reprimanding	2 (1%)	6 (4%)	1 (0%)	3 (1%)
Limits time	0 (0%)	9 (6%)	4 (2%)	0 (0%)
Lack of attention, ignoring question	0 (0%)	3 (2%)	2 (1%)	0 (0%)
Condescending	3 (2%)	3 (2%)	1 (0%)	4 (2%)
Ignoring self-disclosure	0 (0%)	2 (1%)	7 (3%)	0 (0%)
Misunderstands question	0 (0%)	1 (1%)	1 (0%)	0 (0%)
Inappropriate script or inappropriate response	2 (1%)	4 (3%)	6 (3%)	2 (1%)
Failing to offer reassurance	2 (1%)	7 (5%)	13 (6%)	3 (1%)
Mirrors rude behavior	1 (1%)	0 (0%)	0 (0%)	1 (0%)
Disconfirming	18 (12%)	3 (2%)	12 (5%)	26 (12%)
Ignoring humor	0 (0%)	0 (0%)	1 (0%)	0 (0%)
Impatience	12 (8%)	2 (1%)	0 (0%)	13 (6%)
Rude or insulting	9 (6%)	0 (0%)	0 (0%)	9 (4%)
Inappropriate language	6 (4%)	0 (0%)	0 (0%)	6 (3%)
Failure/refusal to provide info. when asked	1 (1%)	7 (5%)	5 (2%)	3 (1%)
Derisive spelling out nonverbal behaviors	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Mistakes	1 (1%)	0 (0%)	0 (0%)	1 (0%)
Goofing around	4 (3%)	0 (0%)	1 (0%)	4 (2%)
Uses jargon no explanation	1 (1%)	1 (1%)	5 (2%)	5 (2%)
<b>Negative Closure</b>				
Abrupt ending	63 (43%)	23 (16%)	20 (9%)	109 (48%)
Disclaimer	0 (0%)	6 (4%)	11 (5%)	0 (0%)
Premature or attempted closing	0 (0%)	5 (3%)	9 (4%)	2 (1%)
Ignoring cues that user wants more help	0 (0%)	6 (4%)	7 (3%)	0 (0%)
Premature referral	0 (0%)	4 (3%)	8 (4%)	0 (0%)
Sends to Google	0 (0%)	8 (5%)	0 (0%)	0 (0%)
Failure to refer	0 (0%)	2 (1%)	5 (2%)	0 (0%)

Notes: \* Others include College Age or Adults \*\*Columns include nos. & percentages of transcripts that included these relational dimensions.

**Example 1 of Relational Facilitators, "The size of an Atom." (QP 275)**

1	U	hi i have a science question im not quite sure about. which are bigger (from say smallest to largest): and atom, chromosome, molecule, cell, and substance/chemical formula of a substance?
2	L	Patron's screen name: [Patron Name]
3	L	Hi [Patron Name], i'm reading your question now.
4	L	[Patron Name], can you explain "substance/chemical formula of a substance"? is that the size of a substance?
5	U	well, really just a chemical formula. like, is a chemical formula inside a cell, or is it made up of cells,? i wasn't sure about that one.
6	L	When you are talking about size do you mean measurement or weight?
7	U	measurement
8	L	Okay, I'm going to send a description about a size. I can help you with descriptions of each item, and from there you can determine which is smallest to largest...okay?
9	L	<a href="http://www.triumf.ca/EHS/rpt/rpt_1/node7.html">http://www.triumf.ca/EHS/rpt/rpt_1/node7.html</a>
10	U	ok
11	L	I just sent a description about an atom, did you receive it?
12	U	yes
13	L	Was the ifnformation helpful?
14	U	yes
15	L	Are you ready for another description? When we end this chat, you can add your email, and the links will be sent to you. They will also appear at the end of our chat.
16	L	Also, to make sure I find the appropriate information, what grade level is this information for?
17	U	7th grade, yep im ready
18	L	<a href="http://www.ornl.gov/sci/techresources/Human_Genome/posters/chromosome/faqs.shtml">http://www.ornl.gov/sci/techresources/Human_Genome/posters/chromosome/faqs.shtml</a>
19	L	I just information about the chromosome. Please let me know when you receive it and if it is helpful, or too technical. :) thanks.
20	U	ok, i understand. a cell is bigger than an atom and a chromosome is smaller than a cell, but is it smaller than an atom?
21	L	hmmm...that is a very good question, let me see what i can find...
22	U	ok. thankyou
23	U	actually, i think i get it now. thank you for helping me!
24	L	Okay, would you still like descriptions of the rest?
25	U	maybe just whether an atom is bigger than a chromosme
26	L	<a href="http://antoine.frostburg.edu/cgi-bin/senese/searchglossary.cgi?query=molecule&amp;shtml=%2Fchem%2Fsenese%2F101%2Fglossary.shtml">http://antoine.frostburg.edu/cgi-bin/senese/searchglossary.cgi?query=molecule&amp;shtml=%2Fchem%2Fsenese%2F101%2Fglossary.shtml</a>
27	L	I just sent a description of a molecule. I'm going to look to see about atoms and chromosomes.
28	L	still searching...

*Example 1 of Relational Facilitators, "The size of an Atom." (QP 275) Continued*

<b>29</b>	L	i'm finding information about each, but not in relation to each other....i'm still searching...
<b>30</b>	U	ok
<b>31</b>	L	[Patron Name], I'm at a loss. I haven't found anything to answer your question. I could mark your question for follow-up and someone would get back to you within the next several days. When do you need your answer?
<b>32</b>	U	By tomorrow but i don't think it's vitally important. Thank you for trying
<b>33</b>	U	Patron ended chat session.
<b>34</b>	L	Your Welcome [Patron Name]. Good luck with your project, and I hope you find the answer.
<b>35</b>	L	<a href="http://www.google.com/search?hl=en&amp;lr=&amp;rls=RNWE,RNWE:2004-49,RNWE:en&amp;defl=en&amp;q=define:Chromosome&amp;sa=X&amp;oi=glossary_definition&amp;ct=title">http://www.google.com/search?hl=en&amp;lr=&amp;rls=RNWE,RNWE:2004-49,RNWE:en&amp;defl=en&amp;q=define:Chromosome&amp;sa=X&amp;oi=glossary_definition&amp;ct=title</a>
<b>36</b>	L	Set Resolution: Answered
<b>37</b>	L	Set Description: Homework

## Example 2 of Relational Facilitators: “Diabetes” (abridged)

1	U	Where can I find the leading drug companies in boston doing diabetes treatment/prevention R&D?
2	L	[A librarian will be with you shortly, please hold.]
3	L	[[Name] - A librarian has joined the session]
4	L	[Hello. I'm a reference librarian at University X. How may I help you?]
5	U	Where can I find the leading companies in boston doing diabetes treatment/prevention R&D?
6	L	[Please hold on while I check a few sources.]
7	L	I can probably give you a few sources to get started, but I may wind up referring you to a business and/or medial librarian specialist. Let's start with [univ] library web page...
8	U	ok great thanks
9	L	Are you a studnets or faculty member at [univ]?
10	U	student
11	L	OK. I'm going to try the "co-browse" option -- that might let us see the same information at once...(if it's working!)
12	U	wonderful
13	L	since what you want to find are drug companies, I'll try to get you into a busienss database...
14	U	perfect
15	U	thank you
16	L	[Page sent - subjectlist]
17	L	I clicked on article datbases
18	U	alright
19	L	by the way, wht's your email address in case I need to send yo a transcript?
20	U	[email address]
21	L	Business and Company ASAP and Business Source Premier both look good. I'll try business and company asap.
22	L	[Page sent]
23	L	hmmm. I treid the keywords "diabetes and boston and research" and tht came up with soem possibilities...
24	L	[Page sent]
25	U	uh huh, more specifically im looking for maybe some kind of list of who is doing what, for respective drug companies
26	L	I'm looing at teh actual article and the links at the bottom. The SIC can be particularly helpful...
27	L	Sorry, I thought there was a way you could search by sic code and get a ranked list of companies in a certian code.
28	U	thats alright, seemed liek you were on the right track
29	L	[Page sent]
30	L	What I'm gettign here is a nation-wide list....
31	U	that is good too, It doesnt have to be just boston based companies
32	L	ok. then I did a "limit" to boston or massachusetts and got 77 companies.
33	L	By the way, the busienss Librarian is Business [ [Librarian2 Name]]Tel: [Librarian2 Phone]
34	U	and they are all in the process of Diabetes R&D?
35	U	oh thank you very much

Example of Relational Facilitators: "Diabetes" (abridged) continued

36	L	no. They are not limited to diabetes. These are general drug companies... I veered off but I can bring the diabetes back in the search.
37	L	[Page sent]
38	U	ok great
39	L	I don't know if its even possible, but Im looking for an article or list that kind of names the top drug companies that are doing a great deal is the R&D of diabetes drugs/treatment
40	L	looks like a search under "diabetes" might also be useful. Then I wnet to "narrow"
41	L	I'm having trouble getting you such a list. It might be possible, but we need to play aroudn with our serach terms... or try other data bases for business...
42	U	ok that sounds fine
43	L	or contact the busienss librarian.
44	U	im actually surprised that their isnt a published list in some kind of "big book of business" I know that they have such a list for top nanotechnology firms....
45	U	perhaps the business librarian would be helpful, can i be connected through this same online format?
46	L	yes, there might very well be a book in the Northeastern reference collection. Might be best to call them.
47	L	No, I cannot connect you, but I can look up her email address.
48	U	this online help is very convenient though, my roommate is actually sleeping, so a phone call would be tough
49	U	ok, e-mail should be ok
50	L	[email]
51	L	did you get that?
52	U	alright thank you for your help, have a good day
53	L	If she's not available, try the general reference desk at ... [phone number]
54	L	you can also send reference an emial by using the online form at <a href="http://www.lib.neu.edu/reference/home/askref.htm">http://www.lib.neu.edu/reference/home/askref.htm</a>
55	L	Sorry I couldn't get eh exact anser for you. good luck.
56	L	well, if you wan to hang on, I can try some other things. Like I can try to aks OUR business librarian...
57	U	that would be great actually
58	L	ok, hold on...
59	L	so far, I've asked one of our science librarians, who will call me back. I also sent an email to our business librarian. If/when he respnds, I can forwrd tht message to you at [Patron Email] [this is your email address -- correct?]
60	U	yes, thank you very much s orry im so slow
61	L	I thin I need to leave yo with this. Go into the databses for bussienss and you shold get osme good sources for you r paper. Contact the busienss librarian if you get stuck.
62	L	good bye and good luck.
63		Note to staff: XFERIN [Librarian Name] - user has closed this session]

**Example 1 of Relational Barriers: “Mesopotamian Government.” (QP 44)**

1	U	Can you find me information on Mesopotamian government?
2	L	[Please hold for the next available librarian. If you would like a transcript of this session emailed to you, please type your full email address now.]
3	L	[[Librarian Name]-MillVPL - A librarian has joined the session]
4	L	[Hello [Patron Name]...I'm looking at your question...]
5	L	it looks like your pc is not compatible with mine--we are unable to cobrowse, so I'll go to google to search. Have you looked for infomation there?
6	U	yes
7	L	well I found an excellent link on the google page...you can put into google's search bar : Mesopotamia +government and look at the links they provide...
8	U	can you send them to me
9	L	if we could cobrowse we could look at the links together...but you can do the search yourself, yes?
10	L	Mesopotamia +government
11	L	buhler.usd313.k12.ks.us/prosperity/meso3.html
12	L	www.kidsnewsroom.org/elmer/infoCentral/ frameset/civilizations/meso/gov/
13	L	oi.uchicago.edu/OI/MUS/ED/TRC/MESO/law.html - 14k -
14	U	I have already searched there and that really doesn't help me
15	L	It would be much easier for you to do the google search I showed you so you could click on the links and read the conten as you go along...
16	L	why not?
17	L	Can you describe your needs a little for me?
18	L	[Patron Name]...are you there?
19	U	Well I want to know how the government ran and just a little information on Hammurabi
20	L	okay...let me look at one of the links I sent you...
21	L	The Laws of Hammurabi are the longest and best organized of the law collections that survive from ancient Mesopotamia. King Hammurabi, who ruled from ... oi.uchicago.edu/OI/MUS/ED/TRC/MESO/law.html - 14k
22	L	this link answers your questions--you need to look at this site--can you do that?
23	U	no
24	L	do you know how to use google?
25	U	yes
26	L	www.google.com
27	L	so what happens when you type in the search bar: Mesopotamis +government?
28	L	Mesopotamia
29	U	can you connect me with [Librarian2 Name]
30	L	hold on...
31	L	I don't see anyone with that name--just different libraries. You could log out and come back in again if you like?
32	U	Can you contact me with anyone from the Porter Ranch Library
33	L	I'm going to go on to another person if you don't want to continue--I need to have a little input from you...

*Example of Relational Barriers, "Mesopotamian Government" continued*

34	L	I'm sorry, where is that library--in the LA area?
35	U	yes
36	L	I see Thousand Oaks...but not Porter Ranch...
37	L	you can log out and come back in again...if you like
38	U	can you try the west valley regional
39	L	I'm going to log out now--you can request that when you come back in--I only saw Thousand Oaks...
40	L	oaks
41	U	what
42	L	Try the links I sent you...you can get the information you need---goodbye and come again!
43	U	what
44	L	Note to staff: COMP [[Librarian Name]-MillVPL - user has closed this session]
45	L	Chat Session Ended.

**Example 2 of Relational Barriers: "Telekinetic Powers"**

1	U	I want to learn how to have telekinetic powers
2	L	[A librarian will be with you in about a minute.]
3	L	[MD UM/CP Librarian [Name] - A librarian has joined the session.]
4	L	will be things about it, but may not tell you how to do it
5	L	"telekinetic powers" gets 19,000 hits in google -
6	L	adding site:edu gets 141 - mostly things about stories that talk about it
7	L	"telekinesis" site:edu gets 1900
8	U	I HATE THIS WEBSITE AND I WILL NEVER COME HERE AGAIN
9	U	[patron - has disconnected]
10		Note to staff: COMP [Librarian [Name] - user has closed this session]