Interaction Analysis of FAIMER Mentor-Learner Web Online Collaborative Learning Session

Zayapragassarazan Z [1], Thomas V Chacko [2]

**[1] zprazan@yahoo.co.in,
Additional Professor & Head,
Department of Medical
Education, Jawaharlal Institute
of Postgraduate Medical
Education and Research
(JIPMER), Puducherry-605006,
India.**

**[2]
drthomasvchacko@gmail.com,
Director, PSG-FAIMER
Regional Institute, PSG
Institute of Medical Sciences &
Research, Coimbatore-
641004, India.**

ABSTRACT

This report presents the compilation of interaction analysis of a month long online discussion that supplemented regular FAIMER fellowship programme for health professional teachers. Online discussion forums are considered as an effective means and if conducted using appropriate protocols and activities will help learners to share and gain knowledge from each other. Research on interaction analysis stresses the need for proper protocols to evaluate online discussion for meaningful learning. For preparing this report Henri's (1992) model for interaction analysis of computer-mediated communication was used for the qualitative analysis of electronic discourse that held as part of FAIMER programme among the 2015 and 2016 FAIMER fellows. The key domains examined for reporting are electronic interaction, social cues, cognitive skills and depth of information processing and metacognitive skills and knowledge. Transcript of interaction analysis of 454 mails posted for the entire month revealed most of the interactions were linear and some are of branching type. The social cues used during this computer mediated communication gave recognition to the moderators. Around 60% of participants' information were at the surface level, 25% were at an in-depth level of information processing, and nearly 15% were of both surface and deep information processing. The metacognitive activities identified by Henri, such as planning, self-awareness, and evaluation were also witnessed in this online discussion making the discussion forum learner-centered. The outcomes of this maiden attempt on the interaction analysis supports the assumption of online discussion forums as an important component of online courses, and the need for usable protocols for analyzing the effectiveness of online discussions as a form of computer-mediated communication. Thus, the FAIMER online discussion forum that was created for collaborative learning on the topic "Giving Feedback" fulfils the criteria proposed in Henri's protocol for evaluating meaningful collaborative learning through online discussions. Online discussions if conducted following appropriate protocols will have greatest potential on the impact of learning and can serve as easy and effective means of capacity building of health professional educators.

Keywords:	FAIMER ML Web Discussion, discussion forum, interaction analysis, evaluation of online learning

INTRODUCTION

The use of online discussion forums in education has long been a hot topic in tertiary education. Online discussion forums' activities help learners to share and gain knowledge from each other (Christensen et al., 2015; Gao, Zhang, & Franklin, 2013). However, setting up discussion forums does not ensure that learners interact with each other actively and grading of discussion forum participation is done to ensure qualitative learner participation (Marra, Moore, & Klimczak, 2004). Currently, a major focus has been put onto the better use of discussion forums, but the way in which quality of participation can be evaluated has yet to be adequately investigated (Seethamraju, 2014). Asynchronous discussions are typically an important part of

learning in online or hybrid courses (Dringus & Ellis, 2005; Gao et al., 2013). Discussions offer a way for students to learn and articulate their understanding of learning through interactions with each other and the instructor (Blake & Rapanotti, 2001; Donnelly & Gardner, 2011; Kaye, 1992). The discussion forum is a significant component of online courses (Ryan, 2013). Instructors and students rely on these asynchronous forums to engage one another in ways that potentially promote critical thinking, meaningful problem solving, and knowledge construction (Gao et al., 2013). In spite of the importance of these forums, predominantly used methods for assessing the content and outcomes of these forums has often been limited to frequency counts and other quantitative measures (Marra et al., 2004; Moore & Marra, 2005). Only recently have researchers developed protocols for conducting meaningful qualitative analysis of online discussion forums (Howell-Richardson & Mellar, 1996).

There are various ways to train the health professional faculty on educational science. One of the innovative method of training is through formal online discussion (Chaghari, Saffari, Ebadi, & Ameryoun, 2017; Feldacker, Jacob, Chung, Nartker, & Kim, 2017; Rehal, 2016). The first author being the fellow of the 2015 batch for the fellowship at Foundation for Advancement of International Medical Education and Research (FAIMER) had the opportunity to learn the need of the hour educational topic "Giving Feedback" through online discussions called as Mentoring and Learning Web (M-L Web) which are part of a two-year fellowship program (Anshu, Bansal, Mennin, Burdick, & Singh, 2008). This topic was chosen for the discussion by the fellows during the 2016 onsite session at PSG-FAIMER Regional Institute, Coimbatore, India. This is a collaborative learning process for the moderators and FAIMER fellows. This was one of the reasons to select the online platform as faculty development program for understanding on how to give and receive effective feedback in medical and other healthcare education. This article is a maiden attempt that presents the interaction analysis of PSG-FAIMER Mentor-Learner (ML) Web online discussion by examining the discussion transcripts for learning on the topic 'Giving Feedback' with respect to the conceptual framework developed by Henri (1992).

Conceptual framework

The basis for this report comes from two literature areas: (a) online discussion forums as an important component of online courses, and (b) protocols for analyzing the effectiveness of online discussions as a form of computer-mediated communication. Interactivity has been described as the most striking characteristic of online or computer mediated communication and the factor with the greatest potential to have an impact on learning (Arbaugh, 2000; Christensen et al., 2015; Lew, Walther, Pang, & Shin, 2018). Online learning enables creating a "virtual community of inquiry" that allows learners to construct experiences and knowledge through analysis of the subject matter, questioning, and challenging assumptions (Rowntree, 1996; Ryan, 2013). In a face to face environment, this kind of reflection is often accomplished via synchronous, interactive discussions and problem-solving sessions. Web-based learning courses do not have these opportunities and thus tend to rely on online discussion forums to create them (Henri, 1992; Kaye, 1992).

Various methods have been proposed for analyzing online discussion contents for evidence of meaningful learning and higher-order or critical thinking. One of the popular model for evaluation of online forum was proposed by Henri (1992), which examines the quality of online postings by focusing on four dimensions—(a) social, (b) interactive, (c) cognitive, and (d) metacognitive. The cognitive dimension is broken

down into five types of reasoning skills: (a) elementary clarification, (b) in-depth clarification, (c) inference, (d) judgment, and (e) strategies. Henri's model defined not only the types of skills and interactions demonstrated in online postings, but also attempted to qualitatively define the nature and content of online interactions that give evidence of cognitive development and meaningful learning. Hence, this scholarly report was made for the Mentor-Learner (ML) Web online discussion by examining the discussion transcripts for learning on the topic 'Giving Feedback' with respect to the conceptual framework developed by Henri (1992).

Research questions:

Can online discussions be analyzed and evaluated for meaningful learning?

What are the indicators of effective online interactions?

Objectives:

To do a quantitative and qualitative analysis of the online interaction (Interaction Analysis) held during ML Web Discussion on the topic 'Giving Feedbacak'

To test the suitability of Henri's (1992) model for evaluating online interaction for meaningful learning.

RESEARCH METHOD

Operational definitions

*ML-Web discussion***:** Mentor-learner Web discussion which is part of FAIMER fellowship. The ML Web discussion process facilitates co-learning where each one learns from the discussion under supervision of experienced faculty. This form of e-learning has several advantages, including the interaction among the peers and facilitators, anytime and anywhere access to learning materials.

*Interaction analysis***:** Interaction Analysis is an interdisciplinary method for the empirical investigation of the interaction of human beings with each other and with objects in their environment. It investigates human activities such as comments, use of technologies, identifying routine practices and problems and the resources for their solution. For the purpose of this report it refers to the analysis of electronic communication or computer mediated communication among the participants ML Web discussion.

Participants and course background

The participants for the study were the first year (2016 Batch), second year (2015 Batch) fellows, alumni and faculty members of the PSG FAIMER regional institute.

Pre discussion preparation

The moderators' team included of two fellows from 2015 and three fellows from 2016 batch. The team was guided by FAIMER faculty who were experts in the topic. The resources were collected from various search engines like Pubmed, Google Scholar, ProQuest and text books. These sources were shared by the team members in the group mail and approved by the FAIMER faculty. Proper groundwork was done to plan an online pre-discussion survey using Google Forms. A pre-discussion online survey was planned to know the participants perception about 'feedback' and their learning needs.

Based on the resource materials and the pre discussion survey results the objectives and contents for the month long ML Web discussion were prepared. The appropriate activities were planned to achieve the stated objectives.

The learning objectives for the month were:

At the end of the ML Web discussion the participants shall be able to:

1) derive the meaning of 'feedback' in learning
2) understand the importance of feedback in teaching and learning
3) list the different types of feedback
4) elaborate the principles of feedback
5) recognize the different models of feedback
6) frame feedback strategies by using the clinical vignette/video
7) share their experience on giving and receiving feedback.

Resources shared

Authenticated soft copies of resource materials like monographs, journal articles, videos, posters, case scenarios from various sources were shared among the participants through email.

Nature of activities

Answering the questions posted by moderators, reflect on the case scenarios/case vignettes, plan activities, read and reflect on activities, situation analysis and synthesis of new strategies.

Discussion process

The activity of each week was posted in the specified group mail id in Listserv by the moderator(s) and the participants replied in the same thread. The moderator facilitated entire week discussion by acknowledging, encouraging and highlighting the important aspects of the topic for discussion. This was followed for other subsequent week also. The objectives for the week were discussed through planned activities and the resources which were shared as attachment with the mail. The participants shared their learning experience and the resources through the specified thread. The non-participants were encouraged to participate through constant reminders on their mobile phones and mails by specifying the need to fulfill the requirements of this online session by posting at least one meaningful post per week.

Tools

Pre discussion survey

A pre-discussion online survey was planned to know the participants' perception about 'feedback' and their learning needs. This survey was done by preparing questionnaire in Google Forms and sent via email to all the participants.

Quantitative Data

The total number of messages from the participants, moderators and faculty each week were analyzed manually.

Qualitative Data and Content Analysis Criteria

Henri's (1992) recommendation for interaction analysis in online discussions was used to analyze the qualitative data. First, the interaction patterns (linear vs branched) in the online discussion were studied. Next, the social cues apparent in the dialogue were coded. Third, both the cognitive and metacognitive skills embedded in these electronic conversations were analyzed to better understand the mental processes involved in the discussions. Finally, each message was evaluated for the depth of processing, ie, surface or deep.

Post discussion evaluation

After the online discussion the reflections submitted by the participants to FAIMER on their learning with respect to what they can put to use professionally? and what facilitated their learning? were collected and analyzed as per needs of this scholarly report. This reflection is part of their deliverables to meet the requirements of FAIMER fellowship.

FINDINGS AND DISCUSSION

Quantitative analysis

The participants were health professional educators from medical, dental and nursing specialty with Indian and Malaysian nationality. The designation of the participants ranged from Assistant Professor to Professor. 30 participants responded to the pre-discussion survey. The outcomes of this pre-discussion survey helped the moderators to steer the online discussion to achieve the stated session objectives. There were 454 mails posted for entire month by the participants and the moderators. The week wise topics discussed and mails shared by the participants and moderators is given in Table 1. Maximum mails shared for the topic on week 2 with 166 mails followed by 123 for week 1, 85 for week 4 and 80 for week 3 respectively.

Week	Topics	Number of mails shared
1	Introduction, role of feedback in learning, importance of feedback and Types of feedback	123
2	Principles and models of feedback	166
3	Activity (clinical vignette/video)–feedback for written exam, practical exam and communication skills	80
4	Experience sharing/ sharing of best experiences by FAIMERly for giving and receiving feedback	85
	Total mails	454

Table 1. showing the week wise number of mails shared by the participants
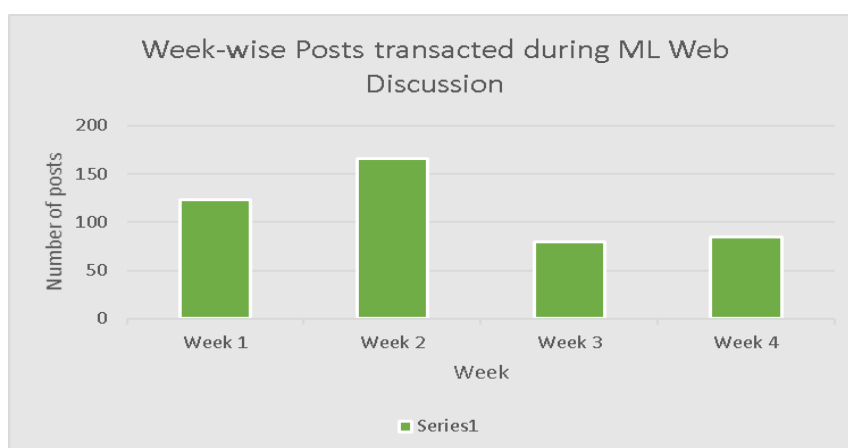
Figure 1. Week-wise Posts Transacted during ML Web Discussion

Qualitative analyses

Electronic Interaction Patterns

In terms of the concept of interactivity, Henri's model consists of three steps. They are:

(1) communication of information, (2) a first response to this information and (3) a second answer related to the first. The following pattern of electronic interaction patterns was observed in the present ML-Web discussion process:

1. The moderator's questions and activities to be responded and performed by the group members and members response to the moderator's questions and activities.

2. Moderator's response and acknowledgement to members response.

3.   Members response in support of other members responses in the form of additional information, resources like articles, videos and pictorials on the topic of discussion.

More than 70% of the responses from the participants were directed as a first response to the question or activity posted by the moderator. This is mainly due to the nature of activity in the form of questions posted by the moderator which has created a tendency to respond to the question alone. This interaction was more or less like a question and answer session. Most of the interactions were linear where the responses were directed to the moderator. But there were also branching type of interaction where the answers to the queries posted by other participants were addressed. The interactions were categorized as explicit where the participants gave authenticated answers to the questions citing references, implicit interaction where the participants cited other participants response with or without naming the person and continue to contribute his ideas and the third category is participants giving out their own ideas, understanding and thought as answers for the question. These observations corroborates with the observations made by (Marra et al., 2004; Seethamraju, 2014). They have stated that Online discussion forums are considered an extension of traditional learning that promotes dialogue, reflection,knowledge construction, and self-assessment.

Social Cues

This study also explored the frequency of the social cues or acknowledgments as indicated by Henry (1992). Social messages were defined by Henri (1992) as a "statement or part of a statement not related to formal content of subject matter." Social cues might include a self-introduction, expression of feeling (e.g., "I'm feeling great,,,,,"), greeting (e.g., "Hi, everyone"), closure (e.g., "That's it for now"), jokes, the use of symbolic icons and compliments to others. Some of the social cues in the form of interactive statements that referred to others postings that figured as part of this ML Web discussion are:

Good Start ! Thank you for the outline and the resources posted

Looking forward to learning on "how to give feedback"

This topic is good topic for discussion and need of the hour

I second the thoughts of …

Well start of the week and the need of the hour too..

Wow great start and valuable discussions and cartoons…

These social cues had a good impact on the participation level of the participants that made them feel comfortable and participate in the online discussion more actively. These social cues also gave recognition to the moderators' effort in moderating the online session which was evident through the reflections submitted by the participants. These results suggest that judicious use of social cues can help students construct knowledge and maintain social relationships (Chen, Chiu, & Wang, 2012).

Cognitive Skills and Depth of Cognitive Processing

The categories for identifying cognitive skills in electronic discourse were adapted and modified from Henri (1992). It is interesting to point out that Henri's suggestions are similar to Benjamin Bloom's (1956) Taxonomy of Educational Objectives for the cognitive domain. Bloom's (1956) taxonomy for the cognitive domain describes progressively higher levels of cognitive activity from factual information at the knowledge level to judgment and rating of information at the evaluation level. As stated earlier in the electronic interaction patterns findings, moderator's questions influenced the quality of the cognitive skills displayed in the ML web discussion. Henri talks about five categories for analyzing online discussions related to the cognitive dimension. These categories include: (1) elementary clarification; (2) in-depth clarification; (3) inferencing; (4) judgment; and (5) application of strategies. All these five categories of cognitive dimensions were witnessed during the ML web discussion on 'Giving Feedback'. They are evident by the posts transacted and reflections submitted by the participants on what did they learn and what they can put to use professionally out of their learning. This is mainly because the activities of the week were aligned in such a way following the maxims of learning such as known to unknown, simple to complex and concrete to abstract. The activities for week 1 provided opportunity for the participants to discuss the meaning for feedback, its importance, stakeholders of feedback and different types of feedback to its entire length and breadth. The participants responses ranged from simple to complex information on the meaning and importance of feedback. The activities for week 2 enabled the participants to explain the principles of effective feedback, popular models of feedback and strategies to enhance feedback seeking behavior among students. This brought out more contemporary information on what goes to make a feedback session more effective while discussing about the traditional to latest models of feedback that are in vogue. The activity on strategies to enhance feedback seeking behavior really tested the participants ability to think and innovate different strategies to enhance feedback seeking behavior making the second week more popular with highest number of postings ie 166 posts. Week 3 was hands-on experience on feedback with case scenarios as activities. Scenario 1 provided opportunity for the participants to design a peer feedback for his lecture session, Scenario 2 provided opportunity to design a feedback to a medical student on history taking at the end of of clinical posting and scenario 3 provided opportunity for the participants to design a feedback session to a postgraduate student to improve his /her seminar presentation. Week 4 was dedicated for discussion on how to receive feedback?, types of multi source feedback and on giving critical feedback. These activities provided opportunity to learn something new such as multi-source feedback which triggered more new information from the experienced participants. This also provided opportunity for some of the participants to share their experience in giving and receiving feedback at different situations. The interaction analyses also revealed that most of the messages were fairly surface in terms of information processing. Of the four weeks of detailed analysis around 60% participants messages were at the surface level, 25% were at an in-depth level of information processing, and nearly 15% were of both surface and deep information processing. These observations validate the contributions made by Smith (2008) and Vonderwell, Liang, & Alderman (2007) regarding the assessment of student contributions to online discussion boards.
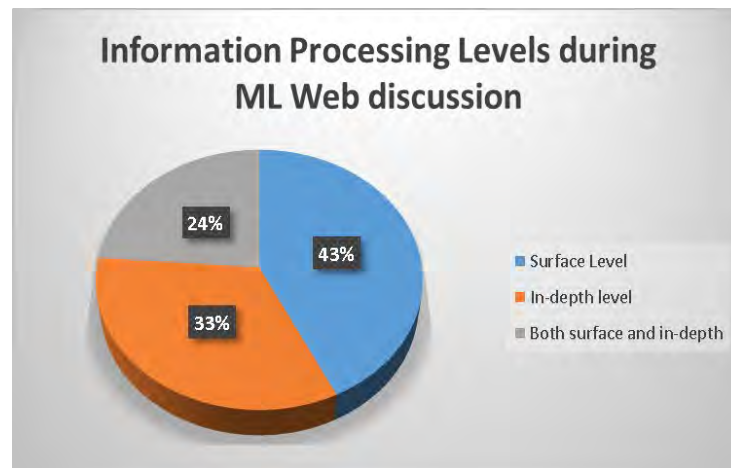
Figure 2. Information Processing Levels during ML Web Discussion

Metacognitive Skills and Knowledge

Henri's model also calls for two distinct classifications of metacognition: metacognitive skills and metacognitive knowledge. All metacognitive activities identified by Henri, such as planning, self-awareness, and evaluation, appeared in this online discussion. Further the process of self questioning and reflection were also witnessed that are essential for self directed learning. The summarization of week activities, reflection about their own learning and submitting it as part of their learning portfolio are considered as form of self regulated learning induced by this online session. Commenting on other views, inferring one's views, starting a new discussion, adding additional notes, resources and other media and formats of learning are also part of metacognitive skills and knowledge admitted as acquired by the participants was witnessed in this ML Web discussion. These observations are in agreement with the framework suggested by Murphy(2008) that might be used by researchers analysing transcripts of discussions for evidence of engagement in metacognition, by instructors assessing learners' participation in online discussions or by designers setting up metacognitive experiences for learners.

Electronic Participation

Interesting electronic participation issues were observed during the ML Web discussion. First of all, the participants dominated the discussion and not the instructor, a finding which indicated that this online forum was learner-centered. The moderator created a purposeful learning environment by posing questions, case vignettes, worksheets which made the participants to take charge of their learning and they were responsive to each other. This helped in fostering learner responsibility for each week discussion to learn and reflection on the given topic. They were naturally compelled to learn and provide evidence for their learning. The more they are engaged in responding to online interactions made them more comfortable with the online discussion forum. Another key finding was that very few participants posted just one post per week in order to satisfy the minimum course requirement and they did not make extensive use of this online media for learning. Some interactions were more reflective of one-way than two-way interactions. Assigning the participants to assume the roles of facilitators and discussion participants, the participants became more engaged and comfortable with the online discussion system and helped in fostering student responsibility for each discussion. These findings fall in line with the theorectical analysis of online participation described by Davies & Graff (2005) and Mazzolini & Maddison (2007).

DISCUSSION AND CONCLUSION

An online discussion forum is a ubiquitous communication tool within an online learning environment and significantly shapes the types of communication that takes place. Discussion forums have frequently been used successfully as communication tools in online learning environments to facilitate interaction between learners to share knowledge. Discussion forums also provide an effective opportunity to exchange ideas and share knowledge amongst learners and instructors. There are many reasons behind the wide adoption of online discussion forums, but the major attribute of a discussion forum is its asynchronous nature that enables learners and instructors to communicate with each other at anytime of the day, and without having to find the time for person-to-person interaction. In addition, posting on a forum enables the discussion to be public and accessible by all other learners in their own time.[5] Thus, the FAIMER ML Web discussion on the topic 'Giving Feedback' fulfilled all the attributes of effective online discussion suggested by Henri (1992) to a satisfactory level. This is evident from discussions which showed the contents exchanged among the participants, the planning involved in executing the online discussion in alignment with the objectives of the sessions, the knowledge and experience gained by the participants as declared by them in their reflections on their learning. Meaningful evaluation of discussion forums is possible beyond frequency counts and other quantitative measures. This study fulfils the criteria proposed in Henri's protocol for evaluating meaningful learning through online discussions and has proved feasible and reliable. This type of collaborative learning process will enable easy and effective means of capacity building of medical educators for the chosen areas.

Hence, the outcomes of this maiden attempt on the interaction analysis supports the assumption of online discussion forums as an important component of online courses, and the need for usable protocols for analyzing the effectiveness of online discussions as a form of computer-mediated communication. Online discussions if conducted following appropriate protocols have greatest potential on the impact of learning. The participants reflection clearly revealed that this format of online discussion helped them to socialize with their counterparts, get accustomed with the online learning environment, promoted interactivity in their communication, acquired improved information processing and thereby attained higher levels of cognition and met cognition about topic of discussion. As a whole this ML Web discussion provided meaningful learning experience on the topic 'Giving Feedback' as per conceptual framework developed by Henri (1992).

REFERENCES

Anshu,, Bansal, P., Mennin, S. G., Burdick, W. P., & Singh, T. (2008). Online faculty development for medical educators: experience of a South Asian program. *Education for Health (Abingdon, England)*, *21*(3), 175.

Arbaugh, J. B. (2000). Virtual Classroom versus Physical Classroom: An Exploratory Study of Class Discussion Patterns and Student Learning in an Asynchronous Internet-Based MBA Course. *Journal of Management Education*, *24*(2), 213–233. https://doi.org/10.1177/105256290002400206

Blake, C. T., & Rapanotti, L. (2001). Mapping interactions in a computer conferencing environment. Presented at the European Conference on Computer Supported Collaborative Learning (Euro-CSCL), Maastricht. Retrieved from http://www.ll.unimaas.nl/euro-cscl/presentations.htm

Bloom, B. S. (1956). *Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain* (2nd edition edition). New York: Addison-Wesley Longman Ltd.

Chaghari, M., Saffari, M., Ebadi, A., & Ameryoun, A. (2017). Empowering Education: A New Model for In-service Training of Nursing Staff. *Journal of Advances in Medical Education & Professionalism*, *5*(1), 26–32.

Chen, G., Chiu, M. M., & Wang, Z. (2012). Predicting social cues during online discussions: Effects of evaluations and knowledge content. *Computers in Human Behavior*, *28*(4), 1497–1509. https://doi.org/10.1016/j.chb.2012.03.017

Christensen, S. S., Andrews, C., Harris, S. P., Lloyd, A., Turley, C., & West, R. E. (2015). Interactive Learning Environments, 2004-2013. *Educational Technology*, *55*(5), 43–48.

Davies, J., & Graff, M. (2005). Performance in e-learning: online participation and student grades. *British Journal of Educational Technology*, *36*(4), 657–663. https://doi.org/10.1111/j.1467-8535.2005.00542.x

Donnelly, R., & Gardner, J. (2011). Content analysis of computer conferencing transcripts. *Interactive Learning Environments*, *19*(4), 303–315. https://doi.org/10.1080/10494820903075722

Dringus, L. P., & Ellis, T. (2005). Using data mining as a strategy for assessing asynchronous discussion forums. *Computers & Education*, *45*(1), 141–160. https://doi.org/10.1016/j.compedu.2004.05.003

Feldacker, C., Jacob, S., Chung, M. H., Nartker, A., & Kim, H. N. (2017). Experiences and perceptions of online continuing professional development among clinicians in sub-Saharan Africa. *Human Resources for Health*, *15*(1). https://doi.org/10.1186/s12960-017-0266-4

Gao, F., Zhang, T., & Franklin, T. (2013). Designing asynchronous online discussion environments: Recent progress and possible future directions. *British Journal of Educational Technology*, *44*(3), 469–483. https://doi.org/10.1111/j.1467-8535.2012.01330.x

Henri, F. (1992). Computer Conferencing and Content Analysis. In A. R. Kaye (Ed.), *Collaborative Learning Through Computer Conferencing* (pp. 117–136). Springer Berlin Heidelberg.

Howell-Richardson, C., & Mellar, H. (1996). A methodology for the analysis of patterns of participation within computer mediated communication courses. *Instructional Science*, *24*(1), 47–69. https://doi.org/10.1007/BF00156003

Kaye, A. R. (Ed.). (1992). *Collaborative Learning Through Computer Conferencing: The Najaden Papers*. Berlin Heidelberg: Springer-Verlag. Retrieved from //www.springer.com/la/book/9783642776861

Lew, Z., Walther, J. B., Pang, A., & Shin, W. (2018). Interactivity in Online Chat: Conversational Contingency and Response Latency in Computer-mediated Communication. *Journal of Computer-Mediated Communication*, *23*(4), 201–221. https://doi.org/10.1093/jcmc/zmy009

Marra, R. M., Moore, J. L., & Klimczak, A. K. (2004). Content analysis of online discussion forums: A comparative analysis of protocols. *Educational Technology Research and Development*, *52*(2), 23. https://doi.org/10.1007/BF02504837

Mazzolini, M., & Maddison, S. (2007). When to jump in: The role of the instructor in online discussion forums. *Computers & Education*, *49*(2), 193–213. https://doi.org/10.1016/j.compedu.2005.06.011

Moore, J. L., & Marra, R. M. (2005). A Comparative Analysis of Online Discussion Participation Protocols. *Journal of Research on Technology in Education*, *38*(2), 191–212. https://doi.org/10.1080/15391523.2005.10782456

Murphy, E. (2008). A framework for identifying and promoting metacognitive knowledge and control in online discussants. *Canadian Journal of Learning and Technology / La Revue Canadienne de l'apprentissage et de La Technologie*, *34*(2). Retrieved from https://www.cjlt.ca/index.php/cjlt/article/view/26417

Rehal, S. (2016). Transforming future public health professionals through open and distance learning (ODeL): Case study of UPOU's International Health Program in the Philippines. *Asian Association of Open Universities Journal*, *11*(2), 149–165. https://doi.org/10.1108/AAOUJ-09-2016-0028

Rowntree, D. (1996). Networked teaching and learning: teaching by correspondence in the XXI century? *Italian Journal of Educational Technology*, *4*(2), 29. https://doi.org/10.17471/2499-4324/687

Ryan, R. S. (2013). The Effect of Online Discussion Forums on Student Learning and Student Perception of Learning in a Science Course at the Community College Level, 170.

Seethamraju, R. (2014). Effectiveness of Using Online Discussion Forum for Case Study Analysis [Research article]. https://doi.org/10.1155/2014/589860

Smith, H. (2008). Assessing student contributions to online discussion boards. *Practitioner Research in Higher Education*, *2*, 22–28.

Vonderwell, S., Liang, X., & Alderman, K. (2007). Asynchronous Discussions and Assessment in Online Learning. *Journal of Research on Technology in Education*, *39*(3), 309–328. https://doi.org/10.1080/15391523.2007.10782485