COLLABORATIVE ONLINE LEARNING IN VIRTUAL DISCUSSIONS

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ABSTRACT

A useful strategy for learning communities in the virtual environment is the real-time forum, also called a synchronous discussion. Due to the fast pace of educational technology, this study hopes to benefit educators by developing an awareness and knowledge of virtual discussion capabilities. Using this strategy, instructors are able to initiate and facilitate their learning environment using dynamic methods of communication in order to achieve successful communication and collaboration between members of the class. This article discusses a case study conducted at Pepperdine University in the Online Master of Arts in Educational Technology and the critical insights which can be used by similar university programs to influence their thinking of how to best prepare future learning communities in virtual discussions. This idea that learning through utilization of real-time discussions is becoming increasingly popular throughout the educational community especially since students have become more advanced in terms of technology than those from just a few years ago. For the instructors, the major hurdle was how to design learning communities that encouraged participation by creating a sense of community greater than what is seen in the traditional face-to-face environments; thus, differentiating them from solely correspondence or courses with asynchronous discussion only. These modes of discussion are powerful environments rich in collaboration, communication, reflection, and practical application. This article addresses some of the key issues concerning this environment, as well as some of its benefits and methods and includes detailed examples. Successful strategies for conducting online discussions are proposed and the study suggests this environment has developed its own

potential for unique dialect that allows communication to be most effective in a text-based environment. Discussion guidelines are also explored. Some changes brought about through Pepperdine's redesign process were obvious; however, other design considerations were more significant in bringing quality discussions online. Local consequences and the broader significance are discussed. Examples are included that describe not only what participants saw as enabling aspects of the support system but also ways in which universities can enhance program development by learning from other pioneers in this area.

Learning is the human activity which least needs manipulation by others. Most learning is not the result of instruction. It is rather the result of unhampered participation in a meaningful setting.

—Ivan Illich

INTRODUCTION

With ever-increasing Internet access combined with the new demands for student growth in technology use and application, it has become not only beneficial, but mandated, that educators begin developing virtual classrooms. A recent study by NCREL discusses the rising popularity and success on online learning:

This intersection of activities has led us to call this phase of computer-based learning "Data-Driven Virtual Learning." This complicated title is intended to communicate that leading-edge technology users have begun to use the vast resources found on the Internet (virtual learning) and the multimedia presentation capabilities of very powerful computers to address data-driven issues and opportunities [1, p. 1].

Virtual discussions show great promise as an instructional technique that extends the formal classroom meeting learning. Since meaningful learning is the main focus of virtual discussions, and virtual discussions provide a dynamic way for meaningful learning to take place, this article will discuss the environment surrounding the real-time, online discussion forum.

Pepperdine University's community-based cohort model utilized in the Master of Arts in Educational Technology provides data for grounding this discussion and is presented as an example of how strategies can potentially promote substantive virtual discussions and support. Over the past several years, my colleagues and I have been designing and delivering on-line education for hundreds of teachers and corporate trainers. The purpose of this article is to describe the structure and interactive design of the learning communities in virtual discussions including descriptions of strategies and the functionality of the different dynamics.

BACKGROUND

There are many techniques available that can aid teachers in formulating strategies to develop online courses that create high impact learning environments supported by collaboration, interactivity, active participation, and knowledge application. Several social and cognitive psychologists such as Dewey [2], Piaget [3], Bruner [4], Vygotsky [5], Lave [6], Wenger [7], and Bandura [8] define learning as a social activity where learning is constructed as a result of interaction and shared efforts to make sense of new information. In Pepperdine's program, it is believed that learning may best be achieved through the social construction of knowledge in a "community of practice"—an environment where the student is both a member of a learning community and also an agent of the learning within that environment. In this model, access to and use of valid and relevant knowledge for teaching in virtual discussions somewhat depends on student success in learning with one another.

At Pepperdine, the establishment of a strong community of practice is imperative for a group of busy professionals learning together virtually over an extended period of time. Participants share a common set of purposes, practices, and perspectives and collaborate in a playful, yet purposeful setting, engaging in activities that maximize active learning opportunities. Instructors encourage and maintain electronic discussions and provide meaningful feedback on student assignments. Students and instructors communicate online via e-mail attachments, instant messaging, newsgroups, synchronous real-time environments, and personal Web pages, to name a few. Students plan and develop a personal Web site enabling them to achieve the prescribed learning goals of the particular program. They also build digital portfolios on the site of work highlighting research and project-based problem solving assignments.

SIGNIFICANT STRATEGIES

Students have become more advanced in terms of technology as a vehicle for communication than those from even recent times due to constantly changing learning environments, where there are ever-expanding electronic resources available to extend the scope and content of the curriculum [9, 10]. A constant challenge for educators lies in keeping online courses "alive." The major hurdle is to design learning communities that encourage participation; thus, differentiating online courses from being solely correspondence courses by creating a sense of community greater than what is seen in traditional face-to-face environments. At Pepperdine, this has been accomplished through the online discussions that enable students to share personal experiences that relate to course topics. Like Tapscott [11], we find the "Net Generation," our students, expect more active ways of seeking entertainment, knowledge, and social interaction. In other words, learners thrive in a social and educational space with resources that reflect real life learning

activities, which are practical, highly motivating, and challenging. Students today naturally gravitate toward media that enables them to communicate and form communities around issues of identity, shared values, and interests as well as practice. This system is the construction and reproduction for ways of engaging in the workplace.

The following summarizes some critical insights from Pepperdine's model, which can be used by similar university programs to influence their thinking about how to best prepare future learning communities of students in virtual discussions. It will also help prepare them for greater participation in other communities of practice. Some insights gained through the design process are obvious; however, other considerations are more significant in bringing quality discussions online. We not only describe what participants see as enabling aspects of the support system, but also ways in which universities can enhance program development by learning from other pioneers in this area.

Get Started Face-to-Face

Prior to the course it is most valuable to initiate a physical meeting of all the course members. The emergence of a mixed mode of learning, face-to-face and online learning activities, is becoming popular. The relationships they rely upon during Pepperdine's program are developed during an initial face-to-face meeting that is mandatory at the onset of the program. This face-to-face session helps less experienced students become comfortable with the technologies and their colleagues. It is key to the creation of the communities in which students will learn, share, and practice over the course of their studies. Students are grouped together and go through the program in cohort groups—communities of practice that encourage and allow them to develop learning together (i.e., Pepperdine refers to the groups as "cadre"). They also become mentors to their colleagues.

The face-to-face meeting and the relationships developed during it, lay the foundation for the educational environment that models the principles of the learning community and the community of practice within the groups. This is how the authentic communication takes place within the groups. Students share and build on ideas of other participants—mutual interdependence and collaboration evolves. Assignments typically require small groups of students to work together to complete projects that enhance the application of their skills while expanding their thinking through the perspectives of their classmates. This student support system can facilitate the completion of projects and the application to the work environment. They begin to appreciate constructionism, bond as colleagues, and become reflective practitioners. The success of this depends largely on the cooperation and collaboration of cohort members toward a sustainable learning community and hence become ongoing learning communities.

Build Community

The interaction we strive for in the online learning community is the product of collaborative creation of meaning and knowledge and focused outcomes. It fosters active reflection of knowledge and generates the development of new knowledge. The result is a collective intellect and mutual accountability. This product of learning is far greater than the total outcome acquired through independent coursework and is progress in learning that cannot be achieved alone. Students build a community that is the result of the skill, imagination, and creativity of the members themselves. In the online discussions they have the ability to communicate with others, manipulate virtual objects, and construct new ones. They not only construct the environment in the discussion, their very identities within the environment are also established. We found synchronous environments to be the most powerful social aspect for this. It allows participants a chance to really get to know each other as a community, which then connects and motivates students toward continuous discussion of content, problem solving, and application in the asynchronous environment. It adds a social dimension by providing real-time updated resources, stimulating curiosity and immediate feedback. Thus, part of the learning is becoming conscious of the subject or experience, addressing changing attitudes, and calling them into question.

The learning group allows a smaller and more focused group of people to help each other. It is in a learning community where help and support are offered to each other in learning. In particular, the main task there is to help each other learn from the material and from each student's experience. Relating theory and practice to each other is an important part of this process. That is what helps develop the learning community into a community of practice. In many instances, it makes visible the learning that has already occurred. For example, members help each other to draw conceptual insights from experience, whether social activities or other experience. Also, it can help improve understanding as to how to apply the social material in practice. The community can also serve a number of other valuable purposes, including providing support and friendship, helping each other decide how to proceed with assignments and projects, exchanging material relevant to the more specific interests of the community, and learning vicariously from one another's experience.

**Share Personal Experiences from Workplace
Related to Course Topics**

Instructors push for contextualized learning experiences in virtual discussions. Learning experiences must be made in the context of the environment in which they work. The course content must have a practical application to the workplace and must promote a constructivist point of view. The investment of time in learning should show a personal return on investment. This contextual foundation allows the immediate application of the learning content, giving it relevance and

credence. The building of support for individual needs through project-based assignments related to the workplace is also advantageous, helping the learner see how each topic, discussion, or activity relates to their world, and the benefits they will gain from mastering the skill or topic. This, in return, increases motivation to succeed in the learning experience.

Information spaces need to be constructed collaboratively [12] and integrated into the work and social practices of the community [6, 13]. These collaborative constructions result in work projects that are enriched by the many perspectives emerging through community discussions. This type of interaction motivates the students to continue when faced with problems or with curriculum-development challenges in their own work. The hope is this community of learning carries over into their community of practice in the workplace.

Issues of leadership are important. We are continually examining leadership practices that support the participation of teachers and corporate trainers in online learning communities, identifying how leaders develop their own learning communities, and illustrating how students become leaders in their workplace to support advanced pedagogies such as collaborative knowledge-building.

Use Open-Ended Assignments

Assignments should pose fully framed themes or questions, albeit purposefully vague. Like Haavind [14], we found this increases the potential of eliciting a participant's real thinking on a topic. An example of an assignment from an introductory course is below:

> This requires individual effort, group planning and a synchronous discussion hopefully leading to some sort of consensus. While I don't wish to tell you too much about the educational objectives for this task (they are in my head, but will wreck it for you if I say too much), I will say that the activity has something to do with learning in the digital age. Feel free to use the net and traditional sources:
> 1) Think about the question (distributed in class).
> 2) Learn some things that will help YOU answer that question.
> 3) Keep track of how you arrive at an answer/opinion/understanding and the resources you use.
> 4) Schedule a time to meet in a synchronous environment with at least 4 classmates (three groups should probably be formed, but part of this process involves YOU organizing yourself to get the work done).
> 5) Try to arrive at a consensus within your group arguing your group's collective response to the question posed.
> 6) Develop a paragraph or two arguing your group's decision.
> 7) Email that paragraph to me, along with the names of your team when you are finished.
> 8) Wait until Monday, you will be notified to post your transcript and persuasive paragraph (I want to avoid polluting the work of another group).

As a few postings are made to the discussion, the instructor culls from the topic a theme worthy of careful focus or deeper digging and holds it up for the group to consider. Such an intervention might include three or four short quotes or paraphrases from earlier comments followed by a bit of explanation or clarification and then a single question to elicit more focused dialogue [14]. This allows for multiple perspectives and deeper reflection on the issues discussed. We believe you have to be responsive to the group and should not lecture online. Students have opportunities to facilitate discussions as part of their participation grade.

From this collective dialogue emerges a shared agenda that allows for more connections between the course content and their own workplace practices. This challenges students to use the Web tools in a number of ways. Students place the themes and highlights they glean from the course readings in Newsgroups and to the whiteboard in the synchronous environment, create Web sites, notes, virtual tours, and objects to create an imposed order for the discussion. This allows participants to think about their potential contributions prior to and during the discussion. Students also identify and assess the credibility of Web resources that can be posted or projected in these discussion environments to inform the discussion, support their contributions, and supplement, extend, and enrich course topics. Students can send images/pictures if they are embedded on Web pages by pushing URLs in the synchronous environment. Students also get practice in leadership and facilitating large and small groups online. For example, they may have to "herd" groups of students together and handle or minimize side conversations and distractions.

Collaborative Project-Based Learning Activities

Like the workplace, getting others involved in reviewing your ideas is important. We create an activity-driven experience for students to generate their own understanding based on their actions with the content and connections with their prior knowledge. Feedback from peers on these activities and projects is an essential part of their development. This delivery approach allows for integration of real time information, multimedia, and ideas. Students can review the activity of others and offer ongoing feedback throughout the project. This "co-construction" of knowledge allows for shared learning in project work. These activities need to be rigorous enough to be meaningful but not overwhelming and not busy work. These virtual discussions make communication easier and allows for reflection and revision in the learning process. Students learn course work and technology skills in a way that also fosters valuable workplace competencies such as teamwork, communication, planning, and problem solving. Student participation in these discussions makes it possible for them to make use of new skills and information they did not have prior to taking the course.

Set Guidelines and Roles to Direct Communication

We found many students feel uncomfortable or frustrated when participating in discussions with no protocol. The purpose of these discussions is to provide students with a structured place each week to share emerging thoughts and questions on learning, and particularly their role as a technology leader in their workplace. It is also a place to interact with other members of the cohort and the instructor around questions and issues that are raised in readings and course assignments, particularly about the links that students see between our readings and their own teaching context. Each participant in class is expected to incorporate information and insights gained from assigned readings and personal experiences into discussions. Guidelines are necessary in initial courses in the program. Students desire real clarity of how to contribute: when, what kind, but mostly how much. If guidelines are not stated at the beginning of the course, students are not sure what might be expected.

Once a community is formed, it grows through continual interaction. Personal reflections are, of course, the most meaningful. However, instructors have found valid and effective ways to generate discussion within a group by setting up roles. Successful cooperative groups depend on each member taking an active role in assuring the group functions efficiently, effectively with each member "pulling their own weight." There are a variety of ways to ensure this. One of them is, assigning specific roles to each member. General roles we have used include *summarizer, facilitator, technician,* or *researcher, insighter, critic,* to name a few. For example, the *summarizer* in each group should highlight two or three main ideas or significant insights from their group's discussion. However, in using these roles it is vital to allow students the choices of the roles among themselves, as well as keeping the role titles at a minimum. Using roles for discussion generation will only be effective if the student is able to connect their own reflections and observations to the role. These roles allow students to examine a discussion from a particular perspective. Students should be involved in selecting their own roles and should have a sense of zeal within the role in order to discuss their topic prospectively and reflectively. Students know ahead of the discussion their roles. This gives participants time to contemplate their role and make notes for comments in later discussion.

Text-based discussion has its own specific dialect and colloquialism; as students become more comfortable in the text-based conversation setting, they become increasingly able to express their thoughts, emotions, frustrations, and even gestures using symbolic or representative techniques. This environment has with it no "rulebook" of behavioral text language. Language as a text-based input also has with it its own drawbacks but which, to eager students, are quickly overcome. One of these problems may be the typing ability and speed of students. Since people generally speak faster than they type, students may find the synchronous discussion setting to be initially frustrating. Yet, we find that students

increase in their speed as well as their ability to articulate (via text) the more they participate in this learning environment. There are other areas of frustration, as well, that can be quickly and easily avoided with introductory instructions in the synchronous process. Below are some simple guidelines that can be given to students to deter the amount of frustration in synchronous discussion environments

1. When "speaking," use a leader (i.e., ". . .") at the end of a statement when not finished with a thought. Anything in excess of three lines of text will be too much so you must divide up your discussion comments into smaller segments so you do not lose the audience while they are waiting for you to type it in. Also, you run the risk that it will be lost as other comments come pouring in right after that were waiting in the cue while yours was being typed and sent. This make the discussion more fragmented.

2. As listener, wait until the speaking person has finished expressing their thought before replying. Be patient and work at not being uncomfortable with momentary silences they are to be expected. Sometimes responses from two or more participants will happen at virtually the same time. Let's say this happens to Austin and Jake. Jake could step back for a moment and let Austin know it is okay to continue by saying something like "Austin, go ahead." After Austin finishes, he needs to return the conversation to Jake with a "Jake what do you think?" or "Jake, do you have more to add?"

3. Stay on topic and share only messages that are relevant to the subject of the discussion group and until everyone that wants to say something about that topic has spoken. Do not perpetuate off topic comments. If someone makes an inappropriate comment, do not add more noise by replying to it in the discussion.

4. If you have specific ideas, resources, or questions you want to share during a discussion, type them into a word processing document and then copy and paste them into the discussion. Most people can copy and paste faster than they can type.

5. Don't worry about spelling. We will assume that all of your misspellings and grammar mistakes are typo errors so don't try to go back and correct them.

6. Use common abbreviations, acronyms, and symbols to simplify your typing. If you are going to use an abbreviation often that may not have a common understanding, define it the first time you use it.

7. Remember that it is easy to misinterpret words when you have no accompanying facial, body, or tone expressions to give additional meaning to those words. Try not to assign a tone to the person speaking. You can use smiley faces (-: to indicate that you're smiling and CAPS to make a strong point. If you do not understand what someone else is trying to say or think you may be misinterpreting what they have said, state your interpretation with a question, "Madeline, are you saying that ÖÖ?" You can add adjectives/descriptors of emotions in the text, too.

8. Use page numbers when referring to readings to help others find place of graphic, quote, or idea quickly.
9. Be civil. Please refrain from inappropriate comments and personal attacks.

Emoticons, Starlines, and Abbreviations

In spite of your best efforts to produce clear, inspiring messages, there will be times when you cannot communicate effectively using only words. When this happens, you might want to try some emoticons, little sideways ASCII renditions of human expressions that help to strengthen the tone of a given message. Here are a few examples—many of you will probably know others you'd like to use:

:-) = User is happy; conveys positive meaning where the intent is unclear or where slight offense might be taken.

;-) = User is winking; intended to tell recipient that the sender is joking or teasing. Note that this is not implying that you should tease your protégé, although some relationships may thrive on teasing or banter—be careful here.

:-(= User is unhappy; helps to put across disappointment, regret, or sympathy.

:-/ = User is embarrassed by their own mistake (think "urk!").

%-) = User is confused, but willing to take the time to understand.

B-) = User is proud (of self or recipient — the "B" is supposed to represent sunglasses).

BTW = By the way.

BRB = Be right back.

IMHO = In my humble opinion.

IMNSHO = In my not so humble opinion.

And, for presentation, these can be mixed with a few more humorous ones:

WYSIWYG = What you see is what you get.

WYSINWYG = What you see is not what you get.

WYSINEUTWYG = What you see is not entirely unrelated to what you get.

TNSTAAFL = There's no such thing as a free lunch.

Just about any common platitude is more humorous when abbreviated and then "played back" [15]. Furthermore, using these guidelines for students can be helpful for avoiding frustration. In addition, the setting down of guidelines prior to the instructional and collaborative periods helps to solidify the community more fully, since each member knows the general format and expected process for communication.

Use Metaphorical Language

Language and communications in online learning is very dynamic and has the potential of being extremely intense. Systems of symbolism, such as metaphors,

stories, quotations, and reflections use emotions to create culture and non-verbal gestures for online language. The use of metaphorical language is one of the most powerful forms of communication, and helps to build the sense of community within the online learning environment. Metaphors allow us to make connections by applying some degree of commonality to a subject perhaps otherwise obscure. It helps to create a mental picture—a visual that not only gives clarity to meaning, but also promotes retention of the new understanding being reached. Metaphorical language is also powerful in the sense that, by naming an actual object and applying it to an idea, the object itself temporarily becomes part of the defining properties, yet retains its original meanings, which allow the connection in the mind to take place. For example, below are actual online comments using metaphorical language in real-time (synchronous discussion):

Ken says, "Hi Karlton, you are light on the toes tonight" *David says,* "lost in a VORTEX of space and time . . ."	*Ron* opens eyes wider and spies the target. Feeling stuck in a GUI web . . . Ann dusts off hands
Jake exclaims, "ground that guy!" *Paula. o O* (A gem cannot be polished without friction, nor a person perfected without trials) *Austin* waves *Nicole says,* "or I will spontaneously combust"	*Marcy* leans in to listen *Pat* is making inferences by taking the comments that I receive personally, looking at what the people are saying and reflecting on my practice *Mike* nods and smiles at K *Madeline* raises an eyebrow

Field trips are also one strategic approach we utilize. Students are encouraged to visualize having class in a new and exciting environment; for example, at the top of Mt. McKinley or at a cabin in the woods. The idea is to motivate them by placing them in an appealing setting. We've found it is best to explore and use environments or settings that have both meaning and motivation in relation to the content focus. Appropriate locations describe things, locations, and phenomena that lack the traditional physical substance. Although they have no real substance or life equivalent, however, the persuasiveness of its representation allows students to respond as if it was based in reality.

Expression without Words

Instructors also must create metaphors especially for non-verbal cues. For example, raising an eyebrow, leaning in, raising a hand, listening eagerly, smiling, ROFLOL, etc. The instructor needs to build in the emotions and non-verbal cues in

text-based synchronous environments to strengthen communication and mutual respect with his/her students.

Limit Group Size

The size of the group definitely makes a difference. At Pepperdine we limit the size of each group. Cohorts are made up of 18 to 20 students who work through the program taking their courses together. Henri and Rigault have the opinion that a number of at least 15 persons will be needed in order to ensure there is a minimum of messages [16]. Conferences or discussions that aim at exploring and collecting information are very suited for large groups, whereas, as regards the carrying out of a project jointly, small groups of three to five would be effective in order to facilitate coordination. Classes are offered to groups at two different meeting times to accommodate the various student locations. Each synchronous discussion group includes approximately eight to ten students each session. For example, my classes are offered at 6:00 am and 7:30 pm. We encourage students to attend only one session of each class each week in the synchronous environments so that the groups are not too big and everyone has a voice.

As students meet in their virtual classroom, the size will often dictate how the class is conducted. For example, if over 12 people attend the same session, the instructor may have the groups break up into smaller groups of two or three, then meet in another separate virtual room to discuss questions or topics presented, followed by getting back together for a final wrap up of the small group meetings. This allows the larger group to reassemble and have a shared focus.

Be a Facilitator not a Controller

Facilitation is an important aspect of the online learning community. The instructor must act as the facilitator in the discussion, without controlling the discussion. Facilitators should preferably coordinate discussions and encourage participation but at the same time they should avoid being identified with authority. This implies discussions in which self-directed as well as peer-to-peer collaborative learning is supported, in which the teacher/expert acts as a "guide on the side" rather than as a "sage on the stage" [17]. Learners will take a topic of discussion, usually presented by the facilitator, in a direction that they need to discuss most.

One of the issues for us has been recognizing the value of spending time with depth (i.e., stay with the process and what exactly are this group's concerns, including identifying and confronting the issues) rather than breadth (i.e., more and more content—the old teaching expert paradigm). Perceptive learning moments may be squelched if the instructor cannot keep out of much of the discussion, once it gets going. The instructor may also assign a student to be the facilitator, in which case the instructor then simply monitors the progress, offers support, and herds the class. Like Poole, we found participation in the course

changed while students served as course moderators, suggesting the positive effect such a role may have on learning and community building [18]. Whether the facilitator is the instructor or an assigned student, there are typical functions for this role that have proven to be the most successful, which include developing objectives, assembling and managing teams/groups, determining and managing student expectations, monitoring topic schedules and time allotted for breakout, and identifying and resolving problems. The nature of the discussions being more direct, interactive, and flexible has brought about a renewed interest in classroom social interaction.

The potential is to be with them as a peer in the journey, even though you have been engaged to lead them. You have been part way yourself, so you can show them that part and point out some of the pitfalls, but this event is also likely to take you where you haven't yet been. Students experience empowerment [19, 20] allowing learners to incrementally acquire ownership in and to actively contribute to the resolution of challenges [21]. As participants act upon a problem, break-downs occur due to incomplete understanding of the underlying problem, conflicts among perspectives, or the absence of shared understanding. By supporting the process of reflection within these discussions that provide a shared context, opportunities arise for building upon these breakdowns in ways that integrate the various perspectives and expertise while enhancing shared understanding. Supporting informed participation requires processes that integrate the individual and the group knowledge through collaborative constructions [21]. Without acknowledging needs such as empowerment, freedom, fun, and belonging, we will not address the challenges faced by authentic real-world learning situations.

CONCLUSIONS

These discussions have enhanced our insights around the socio-psychological implications of Web-based learning environments. Pepperdine's virtual discussions have proven successful, thus far, in achieving the community of practice that is central to its philosophy. The program has facilitated collaboration and built repertoire through joint enterprise (i.e., collaboration and mutual accountability), mutual engagement (i.e., working together, relationship-building, and maintenance), and shared repertoire (i.e., personal stories, artifacts, and experiences). It continues to open a wider range of expression for students, helps them "find" their own voice, simplifies assignment and assessment logistics, and increases the convenience, flexibility, and overall enjoyment of the learning process. These are the broad terms of the impact of emerging technology for virtual discussion on the students as well as other possible factors that have brought higher academic performance.

Because online learning environments and synchronous discussions have the potential for being the most innovative learning tool in technology to date, careful consideration of its implementation and application must be used in order to gain

its full potential. In our experience, a more adequate account of knowledge and leaning is to be found in a social, contextual environment that recognizes the creative and spontaneous nature of the human mind.

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