

A Learner-Centred or Artefact-Centred Classroom? Impact of Technology, Artefacts, and Environment on Task Processes in an English as a Foreign Language Classroom

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Abstract—This preliminary study attempts to see if a learning environment influences instructor's teaching strategies and learners' in-class activities in a foreign language class at a university in Japan. The class under study was conducted in a computer room, while the majority of classes of the same course were offered in traditional classrooms without computers. The study also sees if the unplanned blended learning environment, enhanced, or worked against, in achieving course goals, by paying close attention to in-class artefacts, such as computers. In the macro-level analysis, the course syllabus and weekly itinerary of the course were looked at; and in the micro-level analysis, nonhuman actors in their environments were named and analyzed to see how they influenced the learners' task processes. The result indicated that students were heavily influenced by the presence of computers, which lead them to disregard some aspects of intended learning objectives.

Keywords—Computer-assisted language learning, actor-network theory, English as a foreign language, task-based teaching.

I. INTRODUCTION

COMPUTER-ASSISTED LANGUAGE LEARNING (CALL) has secured a solid status as an academic field, especially since the Internet anchored into our personal lives in the mid-nineties [1]-[3]. Although CALL is perceived as a relatively new research field, its research topics are diverse, from software design to classroom practice, which includes human-to-computer interaction, computer-mediated-communication (CMC), curriculum design, etc. The discipline, thus, embraces different research fields, such as Applied Linguistics, Education, and Computer Science. This paper also takes advantage of the nature of CALL discipline that it attempts to incorporate analytical tools that are drawn from outside of conventional language learning and teaching disciplines, in an attempt of capturing different aspects of CALL classroom activities. Traditionally, in Applied Linguistics or even CALL, in-class activities have been scrutinized by looking at the "people" who were involved in learning or teaching activities. The current study tries to frame a CALL classroom from a different perspective, which treats nonhuman artefacts in a classroom as entities that are equal to humans who influence human actions and activities. The tools

for analysis were drawn from both Applied Linguistics and Sociology of Science to see how presence of computers in a language classroom influenced a curriculum and learners' class activities from different perspectives. In other words, this preliminary study investigates how a learning environment influenced course curriculum and learner behavior by looking at human and nonhuman actors in a learning environment, in this case, a computer room. Macro and micro-level analyses were conducted to see how learners' and an instructor's in-class activities were influenced and altered by the circumstances and the environment. In the macro-level analysis, the course syllabus and weekly itinerary (what is covered each week) of the course were looked at; and in the micro-level analysis, nonhuman actors in their environments were named and analyzed to see how they influenced the learners' task processes.

Actor-Network Theory (ANT) is derived from Sociology of Science, which was mainly developed by Callon [4], Latour [5], and Law [6]. ANT claims that society consists of networks of any material entity, human or nonhuman. According to ANT proponents, *agencies*—capacities to act, of human or nonhuman constitute a network is rather than simple connections of material entities. A key ANT activity is "translation," where nonhuman actors influence or change human actions by their "actions." Callon defines four moments of translation as *problematization*, *interessment*, *enrollment*, and *mobilisation* [4]. Each of these moments explains a sequence how human and nonhuman entities come together or disconnected because of the influence they have on each other. Callon, however, claims that the outcome of the connection is unpredictable. In this paper, the first two moments of translation were considered more relevant to this study, which are briefly explained in the method section II.C.

In the past decade, Actor-Network Theory started to gain recognition in educational research. Fenwick and Edwards' book, for instance, explains how nonhumans can relate to educational settings that "everyday things and part of things—animals, memories, intentions, technologies, bacteria, furniture, chemicals, plants, and so on—are assumed to be capable of exerting force and joining together, changing and being changed by each other [7]." The force exerted from nonhumans has been documented by a few researchers. Roth looked at diffusion of knowledge in a Grades 4-5 civil

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engineering classroom by tracing an object, a glue gun [8]. After one student introduced a glue gun to the class, other students came to use it due to its time efficiency and aesthetic while building their towers collaboratively. Roth claims that a glue gun “transformed” the classroom and its associated practices, as the artefact became a hub of knowledge diffusion due to increased student-student interactions around the object. Barab, Hay, and Yamagata-Lynch also used ANT to analyze actor-network in a project-based Astronomy course at two universities [9]. They incorporated a network approach as one of their analytical tools for capturing knowledge diffusion by looking at nodes (issue at hand) and their links in forming a network of knowledge to see how project proceeded between participants. In language education, including Applied Linguistics or CALL, however, ANT does not seem to have been employed for analyzing classroom activities to date, therefore, the current research may be considered unique in this sense.

The current study is a preliminary study, which attempts to see if a learning environment influences instructor’s teaching strategies and learners’ in-class activities in a foreign language class. The class chosen for the study was conducted in a computer room, while other classes of the same course were offered in traditional classrooms without computers. In other words, the syllabus of the course chosen for this study was not intended for a CALL class but it was designed to be offered in a traditional classroom environment, therefore, the students in the computer room were required to follow the same syllabus and expected to complete the same course requirements. The study also sees if the unplanned blended learning environment enhanced or worked against in achieving course goals, by paying close attention to artefacts in the computer room, especially, computers and their related artefacts. The research questions formulated for this investigation are, thus, as follows:

1. Did the instructor need to adjust tasks and in-class activities in order to fit the learning environment?
 - 1a. If so, what aspects of the tasks and in-class activities were modified?
2. What aspects of course goals were enhanced or neglected due to the environment?

II. METHOD

A. Settings

The course chosen for the current research was called “Concept Building and Discussion” which was a compulsory component of second year science and engineering undergraduate degrees at a large private university in Japan. The textbook and course syllabus were designed by a few faculty members at the Center for English Language Education in Science and Engineering in this university, which were specifically written to equip science and engineering students with academic skills, including research, discussion, presentation, and writing skills. The course was taken by 1,900 students, whose TOEIC (Test of English for International Communication) scores ranged from 200 to 990

(the full mark is 990). The English proficiency of the students under study was considered at a beginner’s level, as the average TOEIC score was about 300. A total of 28 students were enrolled in the class and the course was delivered only in English. The course was designed to be held at a traditional classroom, however, the class chosen for this study was held in a computer room, which had 48 Windows XP desktop computers. The computers were six years old at the time of the data collection, and were due to be replaced in the following academic year. As the course syllabus was uniform across the class, this particular class was also required to follow the standardized schedule and assignments, as the classes held at traditional classrooms would. The university had its own Learning Management System (LMS) and each class had its own pages allocated for its instructor to customize the content and functionalities to a certain degree to fit his or her course requirements. The LMS system for this class was used mainly to take attendance and submit written assignments, which were given biweekly. The system was also used to check if the students understood what was written on the textbook, usually skills required for conducting scientific research, by having them submit written output based on tasks on the textbook completed earlier. Use of LMS, however, was not mandatory for instructors and it was up to them to decide if they wished to make use of the system for their course instructions. The main task that students required to complete was a group presentation. The students were required to choose a topic of their choice and to give a group presentation using PowerPoint. The topics of their presentations varied from the 3.11 earthquake-tsunami disaster to Social Networking Service (SNS).

B. Data Collection

Video and audio recordings were collected by the instructor (the author of the paper) for two weeks (two 90 minute-classes) that lead to the final week that was allocated for student presentations. Video recordings were collected through three digital video cameras, each pointed at a group comprised of three to four students. The audio data obtained from the video recordings were transcribed to identify if students were engaged in on-task talk and what activities they were engaged in.

C. Data Analysis

Actor-Network Theory was employed to see if and how nonhumans, especially computers and their related technologies influenced teacher’s instructions and learners’ activities in the class. ANT was chosen as an analytical tool as it recognizes nonhumans or artefacts (i.e., textbooks, computers, furniture) as actors of communicative networks. One of ANT’s key concepts, *agency* (capacity to act) and concepts from two of the four moments of translation, *problematization* and *interessment* [4], were used for data analysis in order to identify how networks were created or dissolved. According to Callon, some networks begin with *problematization*, in other words, something establishes itself as an *obligatory passage point* (OPP) [4]. An obligatory

passage point frames an idea, intermediary, or problem, and related entities in particular ways to perceive itself as a core of a network. In the setting of the current study, the standardized syllabus can be regarded as an OPP as the course textbook, assignments, and instructors' teaching strategies need to comply with it. *Interestment* is the second stage of the four moments of translation that other entities become attracted or invited to this framing, and they negotiate their roles within the emerging network. This moment is comprised of two stages: 1) The moment of interestment—deciding what entity is included or excluded; and 2) Confirmation of interestment—confirming the soundness of problematization and the coalition between entities.

Video recordings and oral transcripts were also used for identifying human and nonhuman actors, and to observe what nonhuman entities were used or liaised with, and the immediate results of the actions. The definition of nonhuman actors in the current study was decided as any visible entities that directly involved in on-task activities. In this way, any 'concepts' or 'thoughts,' which are invisible on videos, are automatically excluded. According to this definition, therefore, the main nonhuman actors yielded from the current study were computers, computer screens, installed software (e.g., Microsoft Word, PowerPoint, Internet Explorer, etc.), LMS interface, information on the Internet (e.g., content shown in Wikipedia), electronic dictionary, textbook, handouts, pens, paper, classroom furniture, and teaching equipment (e.g., a large presentation screen, an overhead projector, a video projector, etc.).

The following table (Table I) shows the marking rubric for the student presentation. An electronic file (a pdf file) of this document was uploaded to the LMS system and the students were able to download and check during the class or at home while they were working on their presentations. The table was shown on the teacher's presentation screen during the class and the goals were explained one by one to assure students' comprehension.

Table I shows that the students were assessed individually and as part of a group. In order to categories in-class activities, this table was used to see if in-class activities were related to the course goals. Teachers who instructed this course were given a semester-long itinerary for each class, which delineated which pages of the textbook to be covered, exercise and activities to be done, and homework to be given. For the two weeks that the data was collected, the teacher was to give a quiz on the textbook content, explaining how to prepare for a presentation using the textbook, give students time to discuss, prepare, and practice their presentation. On the following week, the itinerary suggested that the teacher to explain the criteria for the final paper and start first half of the student presentations. The last week of the course was allocated only for presentations. In the result and discussion section, the influence of nonhuman actors are discussed in relation to external factors, such as curriculum, itinerary, and assignments in an attempt to answer the research questions.

TABLE I
MARKING RUBRIC FOR GROUP ORAL PRESENTATION

Assessment type	Goals	Sub goals	Points
Individual	1. Asks a question to a speaker in another group presentation (at least one).		1
Individual	2. Responds to a question from audience during own presentation (at least one). (answer provided is appropriate and adequately explained – 2; answer provided is appropriate but inadequately explained – 1; answer provided is inappropriate or unable to answer – 0)		2
Group	3. Gives an oral report on information gathered from the Internet.	3a. Length of report given is appropriate.	1
		3b. Content of report is coherent across all group members	1
Group	4. Forms sentences with target language correctly (e.g., processes, results, problem-solving, ranking). (no noticeable errors – 3; errors rare – 2; occasional errors, impairing communication – 1; frequent errors or little or no evidence – 0)		3
Group	5. Uses appropriate rhetorical macro-structure (greeting – introduction – overview – body – conclusion)		1
Individual	6. Speaks in a manner that is comprehensible to an international audience.	6a. Pronunciation is comprehensible to an international audience.	1
		6b. Voice is loud enough to be heard in normal-sized classroom.	1
Group	7. Located three resources on a given topic from different sources.		1
Group	8. Uses source acknowledgment when necessary.		1
Group	9. Uses quotations and paraphrase correctly.		1
Group	10. Includes a list of references.		1
TOTAL POINTS			15

III. RESULTS AND DISCUSSION

The table below (Table II) shows the relationship between nonhuman actors and their agencies, and how humans acted due to each of the agencies.

TABLE II
NONHUMAN ACTOR AGENCIES AND HUMAN BEHAVIORS

Nonhuman actors	Agencies	Influenced humans	Human behaviors
Computer screen	knowledge diffusion/sharing ideas	students	1) moved computer screens to interlocutors 2) pointed at screens 3) moved in front of computer screens
	confirmation check	students	1) asked the teacher about format of presentation slides
	progress check	teacher	1) checked if students were on the right track in producing presentations
Microsoft Word	keeping records/taking notes/producing texts	students	1) took notes of group discussions 2) typed and checked texts before pasting them onto PowerPoint slides
Microsoft PowerPoint	keeping records/taking notes/producing texts/creating presentation slides	students	1) took notes of group discussions 2) producing presentation slides
The Internet (web browsers)	seeking information for group presentation	students	1) searched task-related information online 2) used translation sites (not online dictionaries)
LMS	distributing teaching materials	teacher	1) posted a marking rubric (a pdf file) 2) showed and explained the rubric
	taking attendance	teacher	1) produced attendance registration cards 2) distributed attendance cards 3) keeping track of student attendance
	Registering attendance	students	1) type in individual key codes to register attendance

In this study, the marking rubric is can be perceived as an obligatory passage point as the students needed to comply with the requirements delineated on the document and the teacher planned her class around it.

A. Macro-Level Analysis

Although the teacher mostly followed the itinerary, she gave more time for the students to prepare for their presentations. She gave them two weeks for preparation and one week for presentations, rather than one week for preparation and two weeks for presentations as indicated on the itinerary. This is because the students' progress was slower than expected due to their lack of interactions between group members. In fact, the students barely communicated with each other unless they found something useful on the Internet. The lack of interaction seemed to be caused from browsing on the Internet to search for materials without having particular aims. In this study, the marking rubric can be perceived as an obligatory passage point as the students needed to comply with the requirements delineated on the document and the teacher planned her class around it. As the above table shows, none of the technologies enhanced teaching strategies, except for showing and distributing documents to the students,

although computer screens helped in some degree that the students could physically show their issues at hand (e.g., slide production), rather than explaining everything orally.

B. Micro-Level Analysis

Some interesting characteristics in student interactions were observed from the video recordings. The students had very short and sudden discussions related during the class, mostly occurred around one group member's computer. The computer screens had flexible arms that allowed them to bend them to different directions. They often bend screens to their group members to show what they found on the Internet. After finishing explaining to their group members, each student went back and worked on their own. The majority of conversations were in this format and they only lasted for 1-2 minutes. They also talked to each other while their eyes were fixed onto their screens. Although most of the students had notebooks to take notes, they rarely used any traditional writing equipment like pens and paper; instead, they used Word or PowerPoint to take notes. They also listed the outline of presentation, which looked similar to "to-do" list and later the list was deleted as they typed in the real content. The use of target language varied across groups, one group out of six groups communicated in English most of the time, however, the rest of the students communicated mostly in Japanese. In the field of Second Language Acquisition, proponents of output hypothesis (e.g., Swain [10], Swain and Lapkin, [11]) and sociocultural theory (e.g., Lantolf, [12]), discussion time is considered very important to internalize the target language. However, most of the students in this class focused more on creating PowerPoint slides, rather than improving their oral skills and presentation skills which were clearly stated in the marking rubric. Table II basically indicates creation of actor-networks, however, there was a case where dissolved network was observed. One student brought in his laptop computer, instead of using the desktop computer in front of him. He claimed that the computers at the university were too old and it was better to work on his computer instead.

C. Research Questions

In this section the research questions are briefly discussed.

1. Did the instructor need to adjust tasks and in-class activities in order to fit the learning environment?
 - 1a. If so, what aspects of the tasks and in-class activities were modified?
2. What aspects of course goals were enhanced or neglected due to the environment?

As discussed in the previous section, the instructor needed to extend predetermined preparation time for completing student presentations due to the students' progress in preparing group presentations. In a traditional classroom setting, students would need to bring in relevant information that is already obtained outside of the class. Therefore, the students in traditional classroom would have more time to discuss with their group members. However, if they do not bring anything to the classroom, students in traditional classrooms would not have anything to work on. The

computer room, therefore, worked in advantage for the students who did prepare before coming to the class, but the environment worked against practicing their oral and presentation skills. In this course, the students spent about two weeks to learn how to acknowledge the sources of information they used for creating presentations. There is a chapter devoted for this purpose and they had a test before start preparing for the presentation task. Most of the groups, however, failed to include reference lists or inserting citations, which were also listed on the rubric. This indicates that the purpose of the task was not fully understood and there were too many criteria that they needed to attend to in a short amount of time.

IV.IMPLICATIONS

The study showed that the computer room provided a somewhat efficient environment for students to prepare for their oral presentations. This is because the networked environment could provide the necessary information needed for producing PowerPoint slides. On the other hand, computers hindered learners from communicating with each other and created a situation where students worked individually, rather than collaboratively. This individualism caused the delay in slide production and further caused discernment of oral output during the class. This can lead to disconnection of important actors, including task goals on the marking rubric. In fact, although the rubric was made available online, most groups did not follow each assessment item closely. Actor-Network theory revealed that artefact she avidly altered learners' on-task behavior, and showed that a course, which was not designed to be conducted in a computer room, can have negative impacts on learning activities; even when the marking rubric clearly indicated task process was as important as the final product. Due to the high ratio of human-to-computer availability, the intended in-class activities differed from the curriculum. The marking rubric, or this course's OPP, should have been the most important checklist to refer to when the students were on task.

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