

*Full Length Research Paper*

# Mechanism for promoting motivation, confidence, and autonomy through synchronic communication sessions in virtual learning environments

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**This study presents a mechanism which explains the effect of synchronous communication on students' perception of the training process in virtual learning methodology used in a postgraduate programme at the University of Santander. We use System Dynamics to design a mechanism that integrates motivation, confidence, trust, and autonomy in students. The results suggest that this mechanism explains why teachers should interact with students to motivate them.**

**Key words:** Mechanism, motivation, teacher immediacy.

## INTRODUCTION

The virtual learning methodologies used in the Master's program in Management of Educational Technology at the University of Santander are based on a pedagogical model used for self-regulated and meaningful learning. Students and teachers interact with computer mediated communication.

In virtual learning, autonomous learning is a key variable for achieving a successful learning process. In the literature, some authors suggest that synchronous communication is not essential to help students learn autonomously. However, in our experience with students, the interaction between teachers and students is very important for students to learn autonomously. This interaction, mainly developed by teachers, is done through synchronous communication.

The virtual training process is developed because students are digital immigrants. In this sense, students are

not always naturally fluent with technology. This is one of the reasons most of them choose to study our program. This might make them feel restricted and lack trust in the use of Information and Communication Technologies (ICT) to establish communication with their teachers. If teachers do not use clear guidelines in the management of communication mediated by ICT with their students, students would feel alone in their formative process. In other words, if we want to promote autonomy in the learning process, our students need some kind of synchronous communication with their teachers.

As a result, in this study, we propose a mechanism to explain why students need this kind of communication and how this communication improves their autonomy. This study presents how teachers' immediacy promotes students' confidence, trust, and autonomous learning through ICT communication. Additionally, we are going to

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explain how this problem is studied in the literature.

The question about the role of communication in learning is not new. In learning, communication plays a central role, and it is also important in virtual learning.

Polino (2003) proposes a concept of perception that refers to the process of social communication and its impact on the formation of knowledge, attitudes, and expectations of the members of a group.

Freeman et al. (2013) establishes that computer-mediated communication defines the ways in which communication technologies have created a new scenario of tools to support human communication.

Some authors, according to Constantino (2010), prefer to speak of electronic discourse (ED) and not computer mediated communication (CMC), because the first term focuses more closely on the linguistic nature of the exchange more than the medium or the channel by which the messages are transmitted.

In this way, we claim synchronous electronic speech (SES), which corresponds to real-time conferences, is a spontaneous but written conversation. We are interested in the study of chats and video-conference that impacts the understanding of and even meta-cognition in the exchange of knowledge. Authors have suggested that the main elements that appear in the communicative process are the emitter, message, and receiver (Lores and Beltrán., 2012), and the three fundamental dimensions or links which define and/or determine the communicative process are human, instrumental, and psychological components.

The aim of this study is to propose an explanatory mechanism to improve our understanding of how synchronous communication is perceived by students of a postgraduate program, in order to promote autonomous learning. In the end, we are going to propose how to increase the effectiveness of synchronous teacher-student communication using virtual learning methodology (Table 1). A literature review on Scopus was performed (18th March, 2017) using synchronic communication and perception as key words. The most relevant results were selected to specify the research area. Table 1 presents the main findings.

From previous research, we found that there was no mechanism that explained how synchronic communication promoted students' autonomy in virtual educational settings. Boulos et al. (2005) reports the effect of communication using Paltalk, but suggests more research studies are required. De Lucia et al. (2009) suggests that communication promotes learning using computer games. Finally, Pilkington (2003) reports that the use of chat promotes collaborative learning.

In this study, we understand why some students with low technological abilities can promote their autonomy in learning due to synchronous communication with their teachers. We used System Dynamics to design a mechanism to understand the benefits of communication among these students.

## METHODOLOGY

System dynamics were used to design a mechanism that explains how teachers' immediacy in communication can promote confidence, motivation, and autonomy in students of a post-graduate program. The following steps were performed:

1. Defining the relationships among the elements of the mechanism in the literature. We identified elements to be considered in this study mechanism and then created relationships among them. These relationships define feedback loops that generate the behavior of the mechanism. This structure represents the study hypothesis on how communication could promote autonomy in students.
2. Designing the working dynamic hypothesis. This representation is related to elements reported in the literature about the problem. Here we propose how the structure produces a range of behaviors.
3. Designing the simulation model. We develop differential equations to represent the dynamic hypothesis and then define units for all the variables, and check the consistency in terms of unit for the model.
4. Developing simulation experiments. The model allows the study to perform simulations to check if behavior can be explained by the structure.
5. Reaching a conclusion on the dynamic implications of the mechanism. Finally, we analyze the model and the results, and give suggestions about the consistency of the study hypothesis and how to improve the process of communication in virtual settings.

## RESULTS

### Working dynamics hypothesis

We developed a working dynamic hypothesis that integrates teachers' immediacy and students' motivation, confidence, and autonomous learning capacity. These variables configure a reinforced feedback loop named R1. This feedback loop works as follows:

If teacher immediacy is applied in the virtual environment, then students' motivation increases. As a result, confidence increases also.

We claim these variables explain an increase in students' autonomous learning. This new autonomy then reinforces students' motivation, which closes the cycle. Every variable included in this mechanism has a balance feedback loop (Cycles B1, B2, B3 and B4). We model this as a way to represent a depreciation process in each variable. In this way, if R1 is not promoting motivation, confidence, and autonomy, the depreciation process is going to reduce the levels of each variable. This is presented in Figure 1.

As System Dynamics Theory (Sterman, 2000) and Institutional Design Theory (Valencia, 2012) are prescribed, this mechanism has path dependency. Even with the depreciation we included, reinforce feedback loops depend on the initial conditions. This means, if the initial values are too low, motivation, confidence, and autonomy will not be promoted. Therefore, teacher immediacy should be a tool to promote confidence and motivation in students in virtual settings.

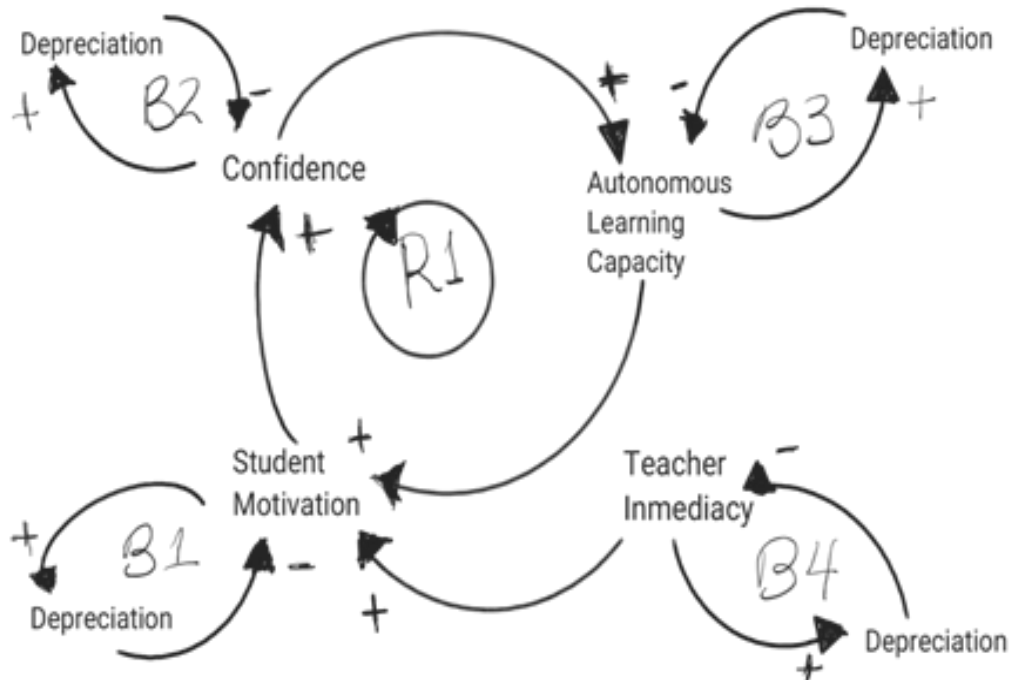


Figure 1. Working dynamics hypothesis.

### Forrester diagram

We designed a diagram of Forrester for the study mechanism, which is presented in Figure 2. We used three differential equations to represent how teacher immediacy promotes students' motivation, confidence, and autonomous learning. The model has the following main differential equations:

1. Student motivation
2. Confidence
3. Autonomous learning capacity, and
4. Teacher immediacy.

### Students' motivation

In Figure 2, we represent the differential equation for students' motivation. The outflow named "motivation depreciation" defines how students' motivation is going to decrease because of the depreciation, based on a life time motivation. If motivation increases, then confidence is going to increase. Students' motivation is related to confidence in a non-linear relationship. This non-linear function is presented in Figure 3. This relationship means that, as motivation increases, that increase affects confidence non-linearly.

### Confidence

Similarly, confidence is represented graphically in Figure 4.

Confidence is decreased by confidence depreciation, which depends on a lifetime confidence. If confidence increases, then autonomy will also increase. Figure 5 presents the relationship between confidence and autonomy. When confidence increases, autonomy is going to increase in a non-linear way defined by the function presented.

### Autonomous learning capacity

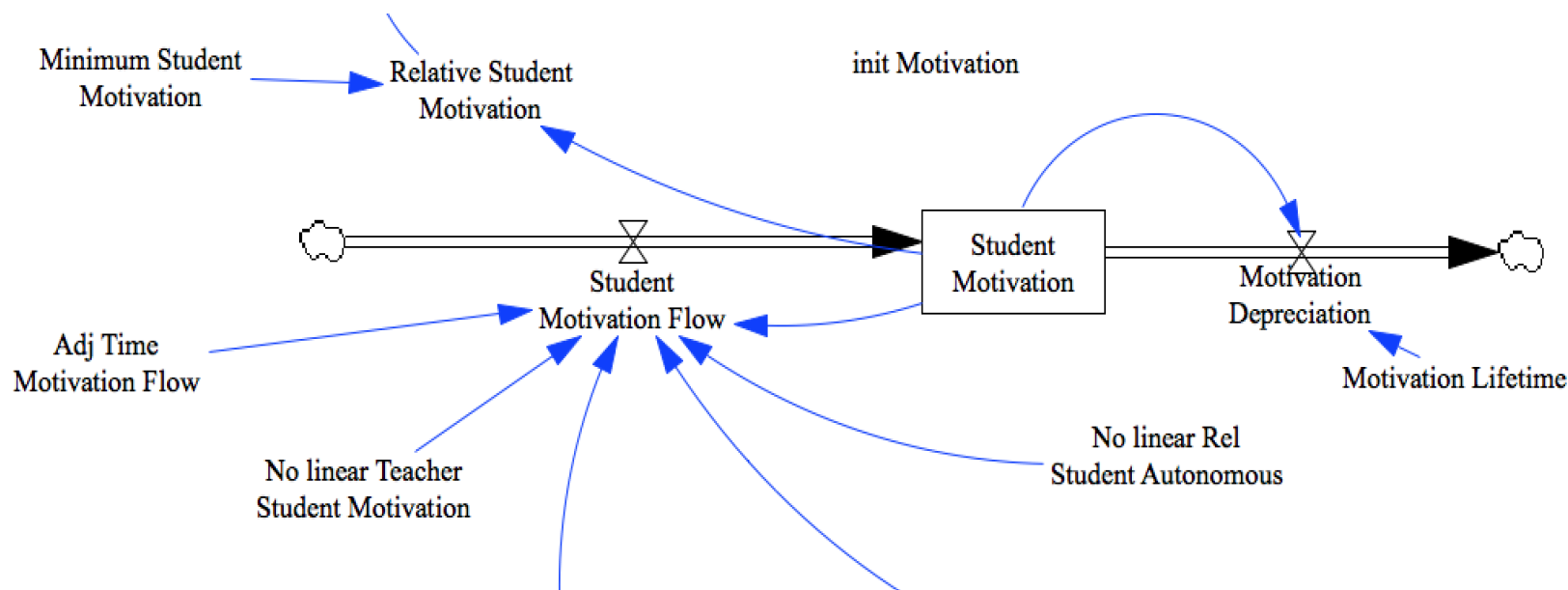
This equation is represented in Figure 6. Autonomous Learning Capacity is decreased by Decreasing Learning Autonomy, which depends on a life time Autonomous Learning. This variable influences feedback motivation. Figure 7 represents the relationship between autonomy and students' motivation. When autonomy has higher values, then motivation is going to increase.

### Teacher immediacy

Teacher Immediacy is represented in Figure 8. This variable is decreased by depreciation, which is a lifetime event. The strategies for teacher immediacy are activated (On) by Strategy Activation and Init Teacher Immediacy, when the value is 1. When the value is 0, the strategy is off. When Strategy Activation is on, motivation is promoted. Figure 9 presents the relationship between teacher immediacy and motivation. At the beginning, there is no change in motivation. However, if the strategy for immediacy takes on a higher value, motivation is promoted.

**Table 1.** Summary of the literature review.

Reference	Problem	Method	ICT Tool	Conclusion	Number of citations
(De Lucia et al. (2009)	Video games affect learning?	Synchronic meeting in second life	Second life, Moodle	Be part of a learning community promotes learning	174
(Boulos et al. (2005)	Effects of virtual classes in post-graduate programs	Configuration	Paltalk	More re-search required	25
Pilkingto (2003)	Effects of CMC Synchronic and roles in collaborative learning	Application prescriptio	Chat	Not presented	6



**Figure 2.** Graphical representation of the differential equation for student motivation.

Finally, the model is represented in Figure 10. The model is solved using Vensim software specialized in designing and solving system dynamics models.

**Simulations**

The mechanism proposed here was tested using Vensim. The model was tested without teacher

immediacy and as expected, motivation, confidence, and autonomous learning were not promoted. Following that, it was tested using teacher immediacy and, as a result, motivation,

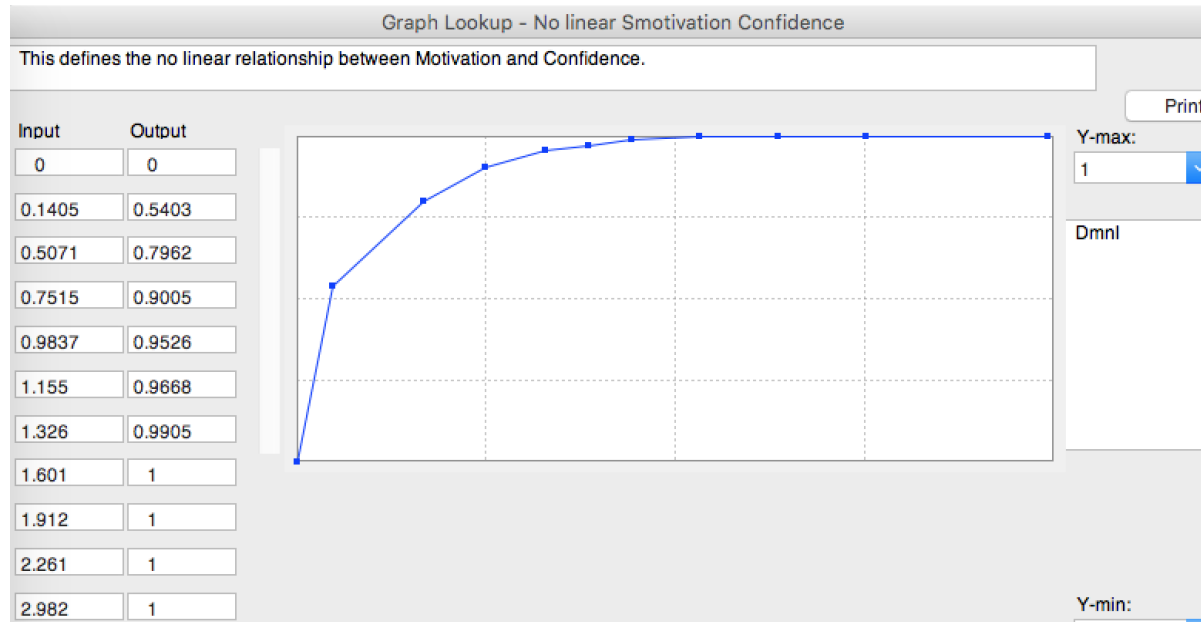


Figure 3. Non-linear relationship between motivation and confidence.

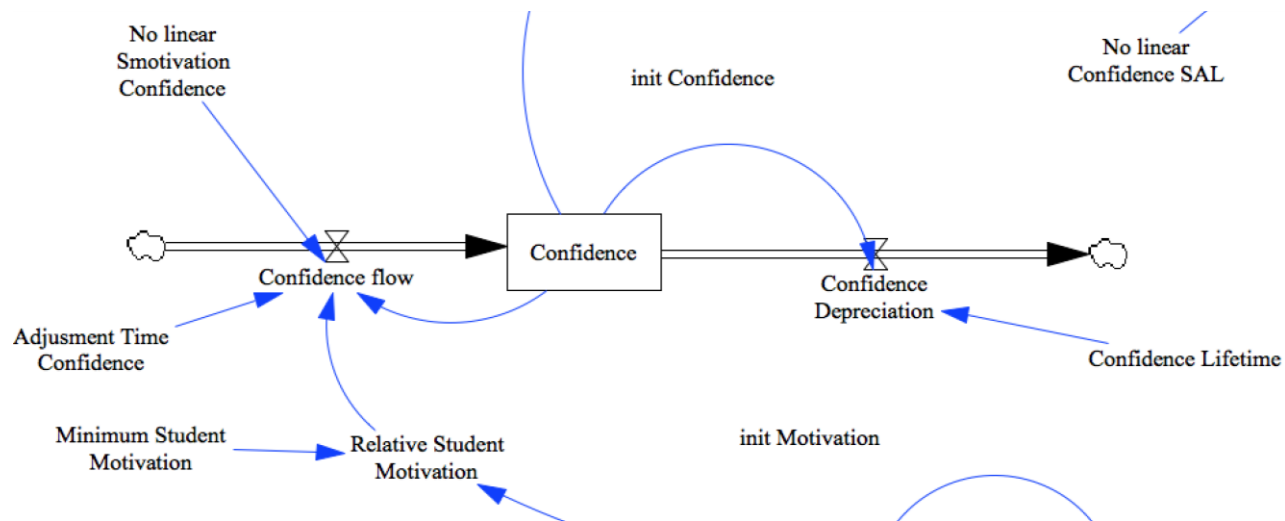


Figure 4. Graphical representation of the differential equation for confidence.

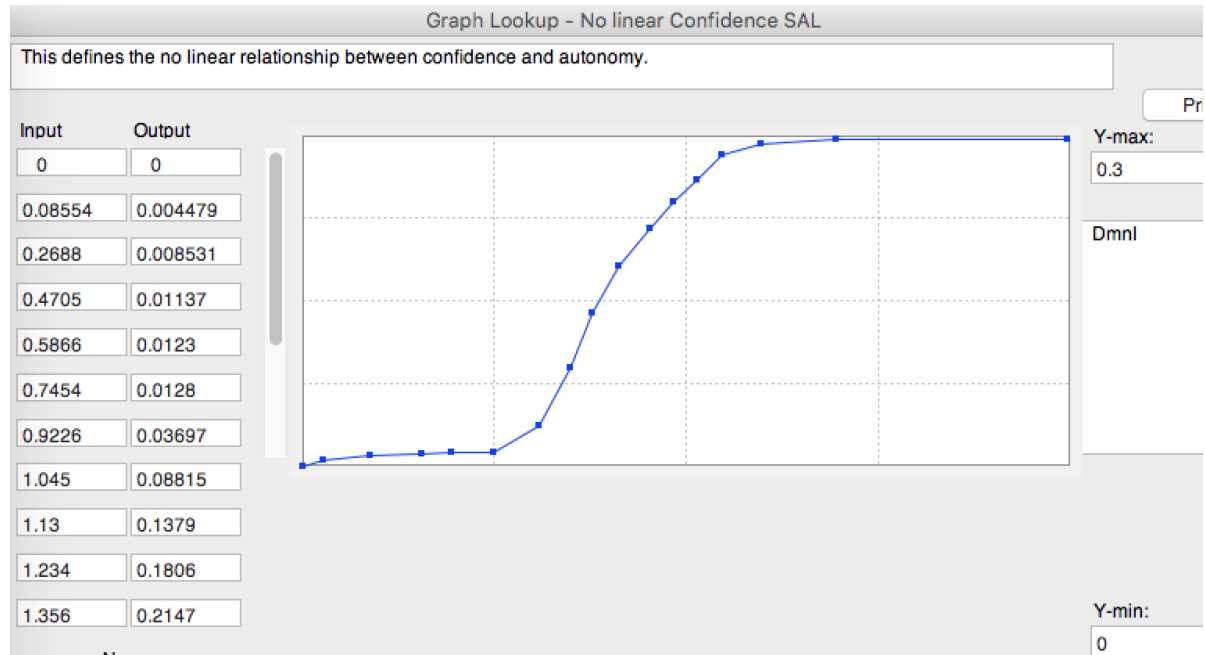


Figure 5. Definition of the relationship between confidence and autonomous learning capacity.

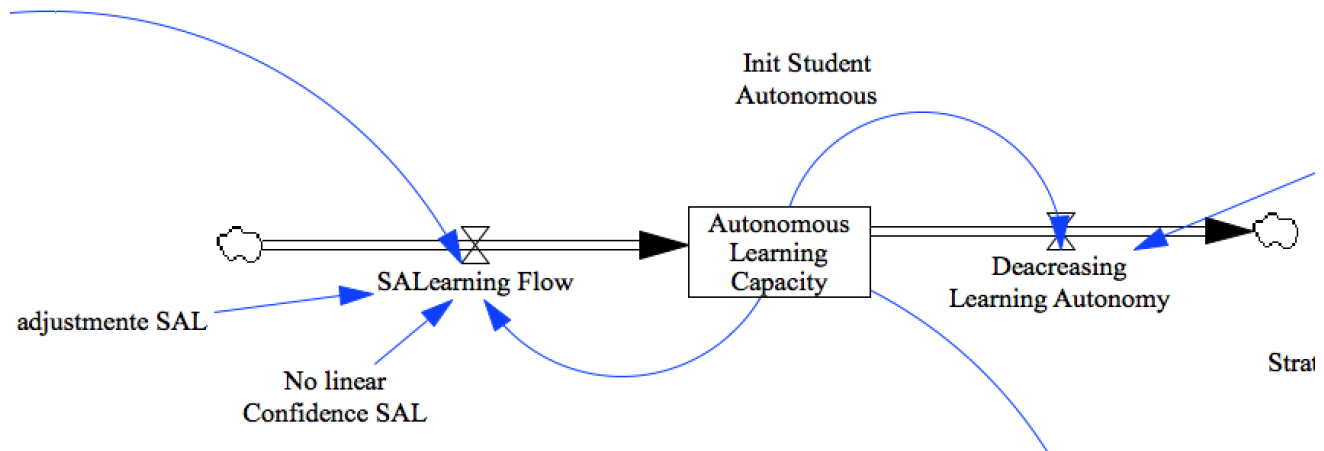


Figure 6. Graphical representation of the differential equation for autonomous learning capacity.

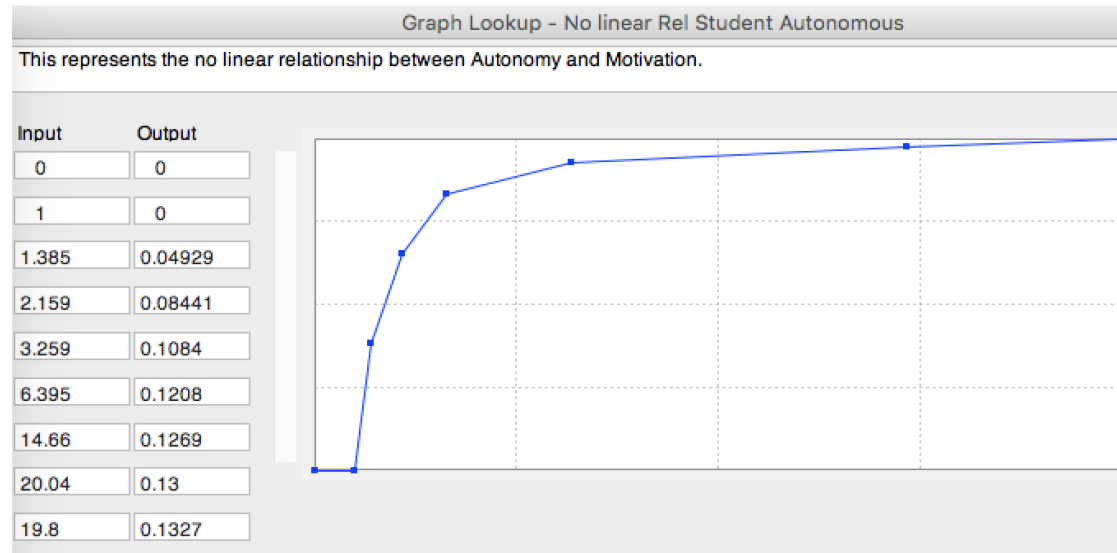


Figure 7. Relationship between autonomy and students' motivation.

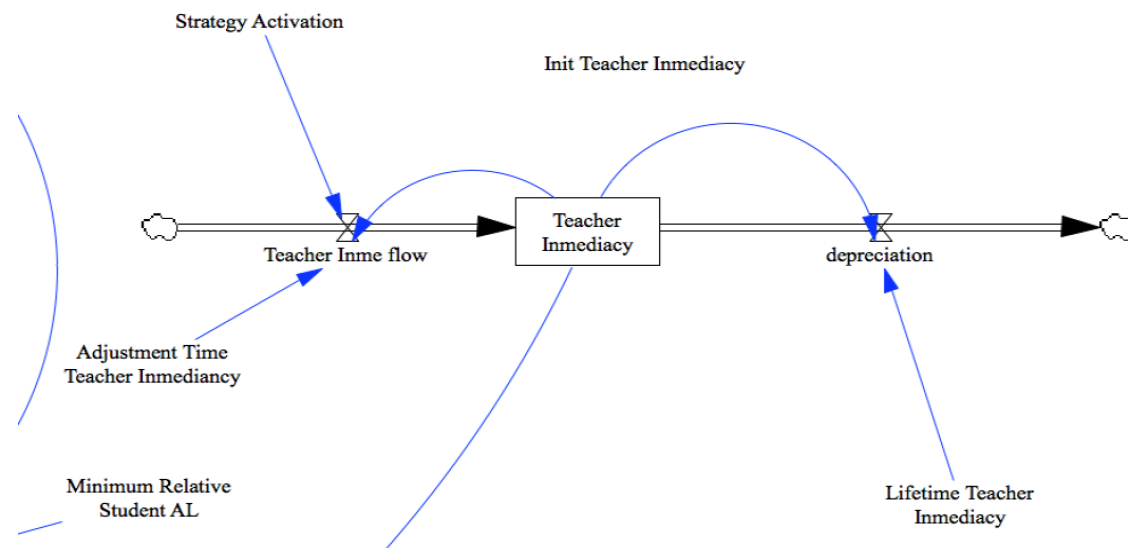


Figure 8. Graphical representation of teacher immediacy.

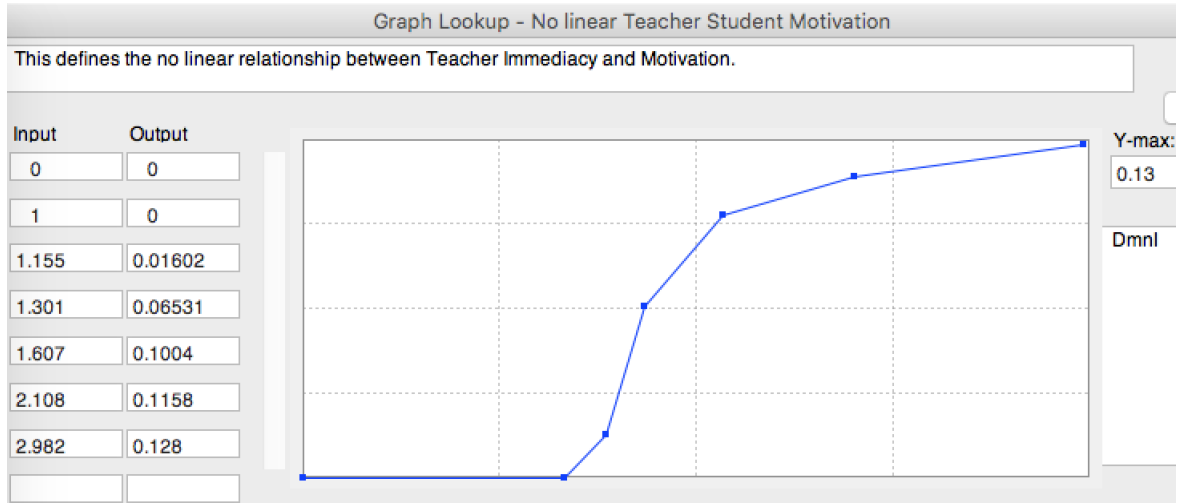


Figure 9. The relationship between teacher immediacy and motivation.

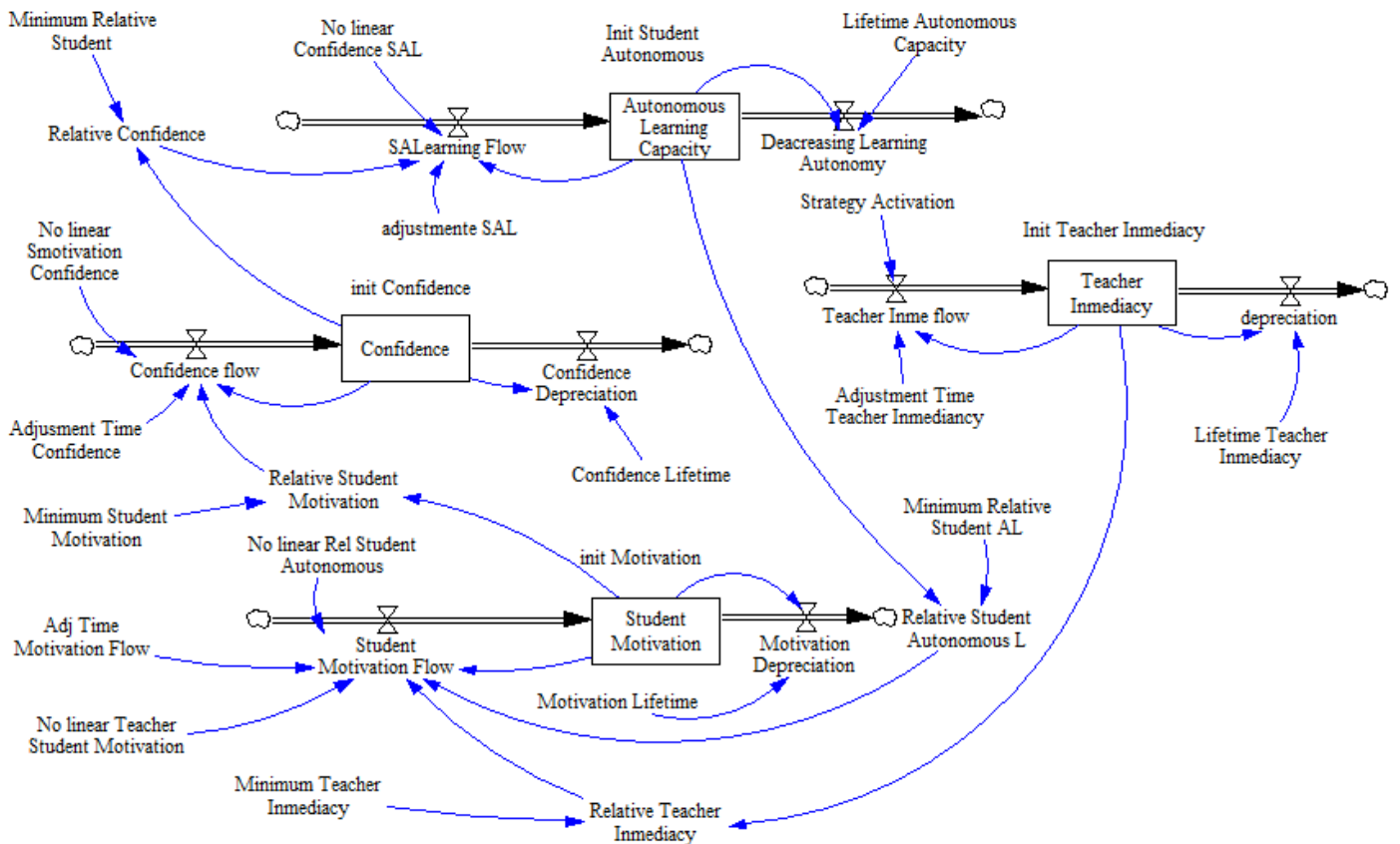


Figure 10. Forrester diagram.

confidence, and autonomous learning were promoted as shown in Figures 11, 12, and 13. Figures 12, 13, and 14 show the effects of simulation of teacher immediacy on students' motivation, confidence, and autonomy. Figure

11 shows clearly the activation of teacher immediacy (red line). The simulation is presented in blue when teacher immediacy is off. Figure 12 presents the nature of students' motivation as a result of the scenarios for



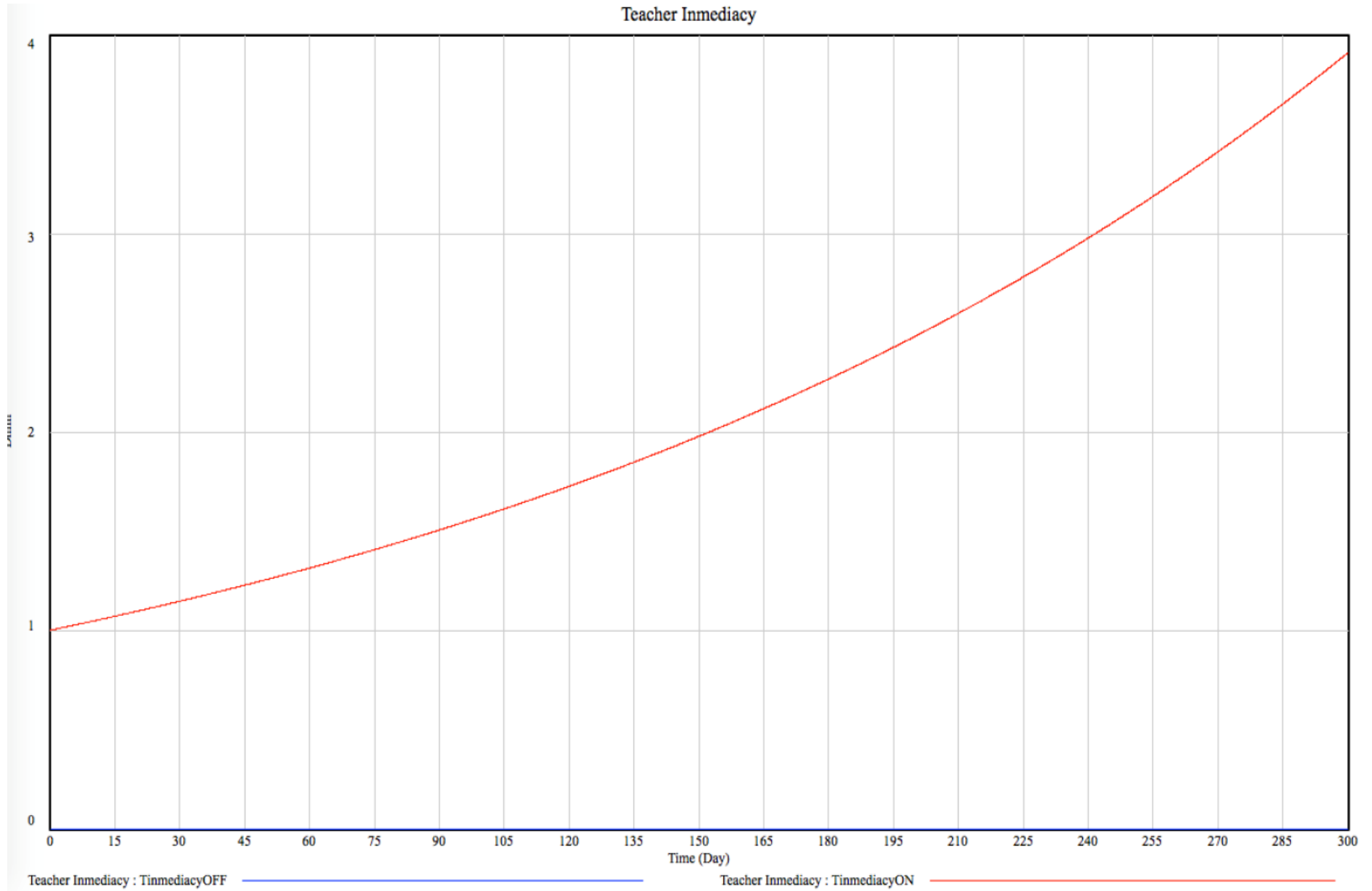


Figure 11. Simulation of teacher immediacy.

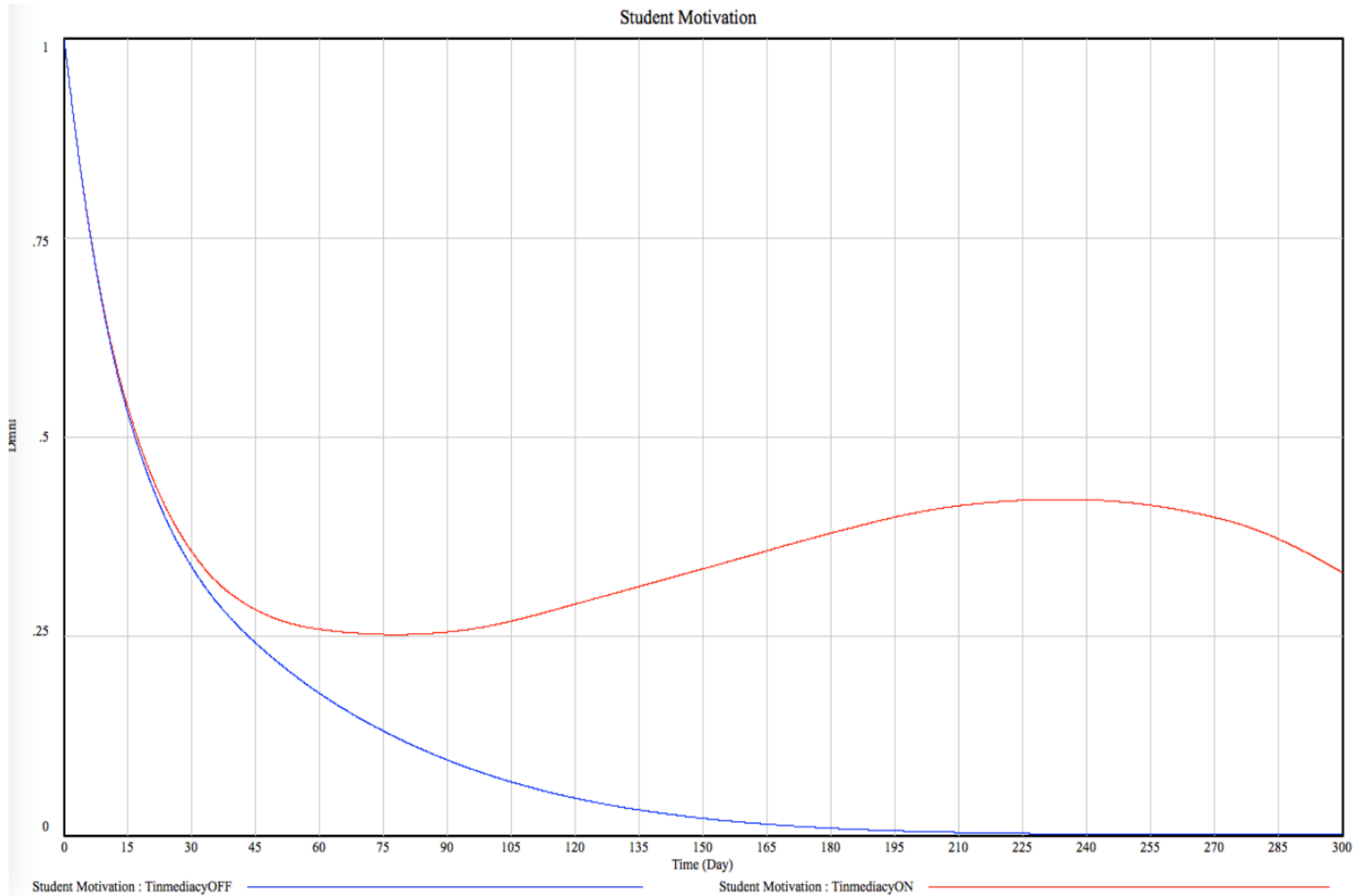


Figure 12. Simulation of motivation.

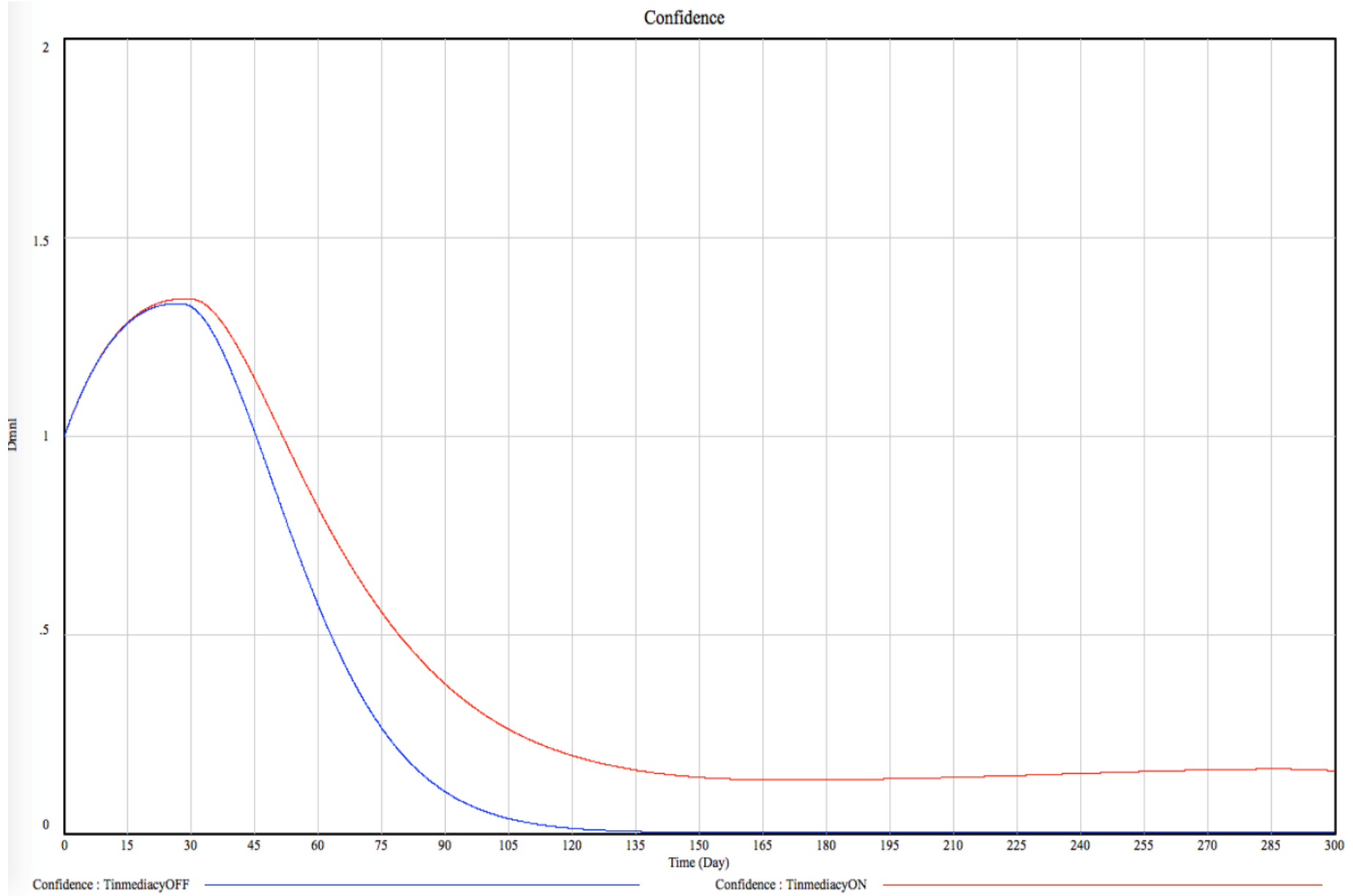


Figure 13. Confidence.

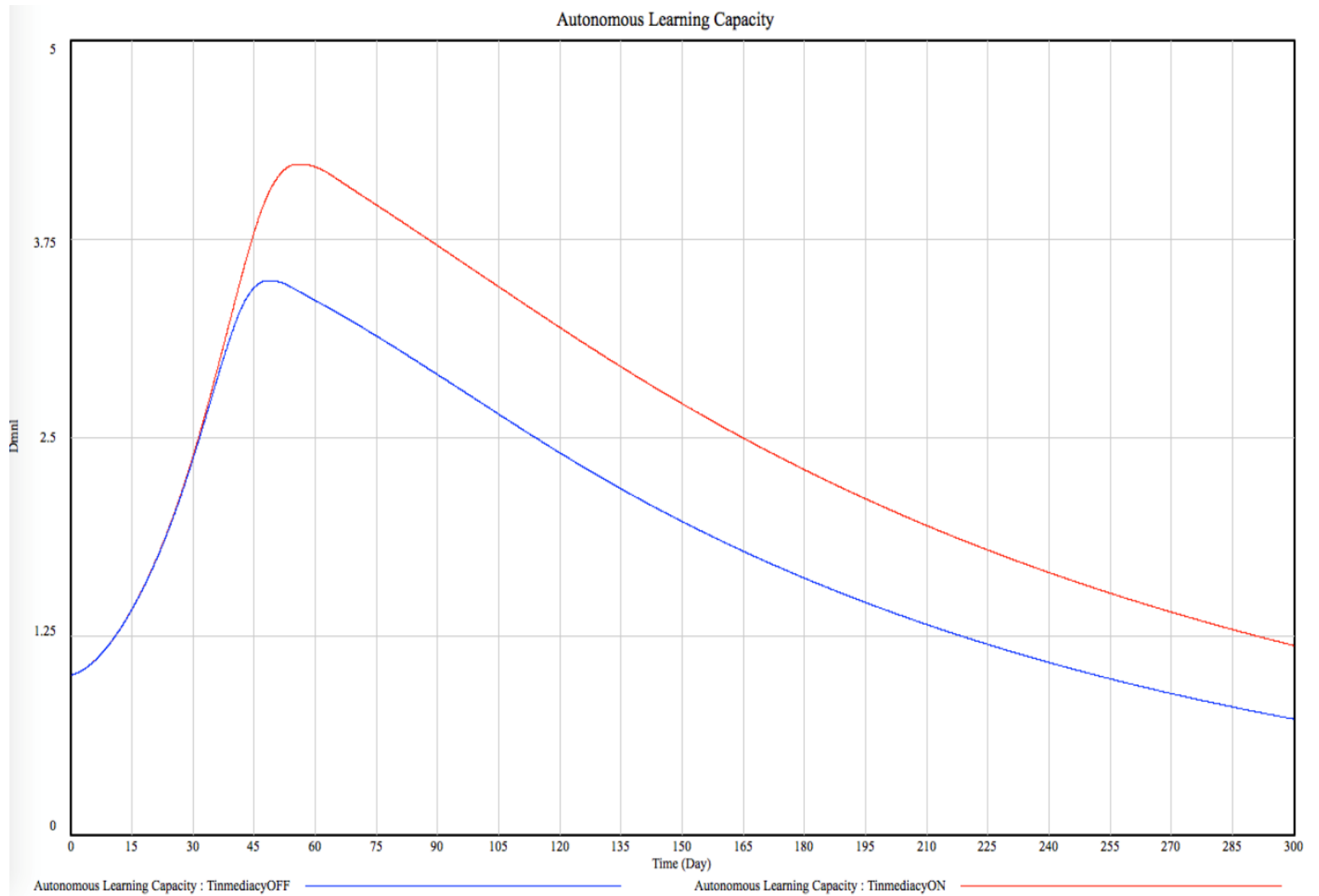


Figure 14. Simulation of student autonomous.

teacher immediacy being ON and OFF. Clearly, we can see how the mechanism promotes motivation. Figure 13 shows similar effects on confidence. Figure 14 presents how confidence promotes autonomous learning capacity. Confidence promotes autonomy more as shown in Figure 14.

## DISCUSSION

We developed a mechanism to explain how teacher immediacy can promote motivation, confidence, and autonomous learning. In summary, if teachers promote communication, students' motivation, confidence, and autonomy, which reinforces motivation will be encouraged. This is evident in simulations of how the mechanism explains our experience with students with low ICT literacy. There are some limitations in this study. More research is required to understand why students lose motivation, confidence, and autonomy without teacher immediacy. We developed the model by using our experience and looking for related experiences in the literature. Because of this, we can develop instruments to get data in our classes to adjust and validate the study model. However, the model is useful to explain why it is important to promote teacher immediacy and communication for supporting motivation, confidence, and autonomy. We found path dependence because of the nature of the reinforce feedback loop. This is similar to literature reports in system dynamics (Sterman, 2000) and institutional design (Valencia, 2012). In this study literature review, we did not find reports on this mechanism developed by us. These results are relevant because we can explain now why it is important to promote synchronic communication in asynchrony post-graduate programs.

## Conclusion

This work proposed a mechanism to explain how teacher immediacy promotes motivation. This is significant because we understand that it is important to interact with students if we want to promote motivation, confidence, and autonomous learning.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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