

A Lateral Construct Analysis of Endogenous and Exogenous Variables in Education

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Abstract

This study explored the role of endogenous and exogenous variables in teaching. The problem investigated was why the teachers did not consider learner variables and the role of variables in teaching. The objectives included the investigation of endogenous variables that affect learning, identification of the role of exogenous variables in teaching, investigating if teachers consider lateral variables in teaching, outlining the role of developmental states of learners, examining the learner variables, and recommending suitable methods of teaching learners. The research questions included ‘do the teachers consider endogenous variables, do they consider stages of child development when they teach, what is the role of learner variables in learning, and do learner variables of male and female students have the same effects? A pilot-tested, researcher-administered 10-item Likert type questionnaire was used to collect data; however, some qualitative data were collected as such qualitative data could enrich the findings. A simple statistical analysis was run on the data to determine if the teachers considered learner variables or not. Findings showed that the teachers did not consider endogenous and exogenous learner variables. It was further reported that the participants did not consider the Piagetian developmental stages. As recommendations, shifting the teachers’ focus from them to learners, promoting learner autonomy and independence in every lesson, stressing the importance of placing the responsibility of learning in the hands of learners and helping learners play an active role were suggested.

Keywords: Education, endogenous, exogenous, variables, teaching.

Introduction

Endogenous and exogenous variables affect the rate, performance, learning, and absorption of information in the classroom. In teaching any

subject or language, these variables should be considered because without knowing them, the whole job of learning and teaching is hard. Age, anxiety, aptitude, proficiency (current level), developmental stage, intelligence, learning style, motivation and personality are some of the most important variables. These endogenous variables affect learning while classroom ambience, extrinsic motivation, nature of the subject or language and teaching styles, being exogenous variables, either affect or have effects on the learning and teaching process. These variables are at the centre of pedagogy and learner achievement is dependent on them. Exogenous factors are noted in learners and teachers, however, most of the time, learner variables are researched; teacher variables, for instance, are barely researched; it may be because that the learner is always subject to rigorous scrutiny, but exogenous factors need research and documentation.

The classroom is where learning and teaching happen. Everything that happens in the classroom is dynamic, nothing in it is static. As such, everything is variable and, in the learning, and teaching process (LTP) process, the impact of variables is serious; at times we are puzzled to understand why some learners fail and we wonder what happens in them. Do we ever stop and think that there is something wrong with the teacher? To make learning happen, every variable must be considered and that every decision we make in the class as practitioners should be questioned. Hence, studying the effects of learner and teacher variables help us better our teaching and professional behaviour, in turn, it results in increased learning.

Variables in Education: Definition

A variable is a quantity which can be quantified (measured) and a variable may take different values. Motivation, for example, is a variable because it varies from learner to learner. In the LTP, variables range from material (content) to be taught to the attitudes of learners. At the centre of LTP are endogenous learner variables. Every learner, in every class, varies in age, attitude, aptitude, intelligence, motivation, prior learning, the current level of learning etc. and these learner variables must be considered when they are taught.

If you observe a teacher in any class, you may see proclivity in her teaching approach to some preferences and such uninformed preferences affect learning. After a lesson, there must be a permanent change in learners' behaviour; to achieve this goal, LTP process must be methodical—without

having any knowledge of methodological assumptions and how knowledge is constructed, we cannot make the process of teaching student centred. These are the key variables, however, there are other variables that we need to consider and as this study focuses only on the variables already discussed, we need to limit our analysis only to the variables that are central in LTP; the remaining variables also have effects on learning.

Teacher Variables

Teacher behaviour, for example, varies from class to class, from time to time, and it is an exogenous variable. We, as classroom practitioners, consider learner variables, nevertheless teacher variables may also have a significant impact on TLP. Though we seriously draw our attention to learner variables, how much our practice influences TLP has hardly ever been researched. In the classroom, much of what happens is attributed to learner variables and we usually do not consider teacher variables because it is not the norm to research or explore teacher variables, instead, the norm and the expectation is that we research, explore, and analyse learner variables. Even research is focused on learner variables, however, we must research teacher variables as well because more than learner variables, teacher variables have an impact and effects on learners' performance. Attribution of learners' low performance to learners' variables without evidence is unwise, teacher variables may also have a profound impact.

Teacher variables, for example, are the least researched variables probably due to our focus being on learner behaviours. However, learner, as well as teacher variables, tend to reciprocate and have causal effects. We cannot separate teacher variables from learner variables. How teacher variables can be researched and why teacher variables should be researched merit our attention because a full examination of teacher variables may provide us with empirical research insight that is useful in changing our professional practice in class and out of class; to date, much of research is learner-centric compared to research conducted on teacher variables. A body of research has been conducted, the findings are all about learners, but we need to evaluate teacher behaviour and factors related to their delivery of lessons.

Entry and Terminal Learner Behaviour

Learner behaviour is divided into 'entry behaviour' and 'terminal behaviour'. Entry learner behaviour comprises of activities before LTP—

learners' knowledge, interests, abilities, attitudes are part of entry behaviour, whereas, terminal behaviour is post-learning or post-activity behaviour at the end of any classroom task. A change of behaviour after LTP leads to terminal behaviour. In a classroom where learners are ready to learn, they wait with alacrity until their comes, this willingness is also part of entry learner behaviour because as much of what is learnt by learners is partly due to motivation, interest, and attitudes they have towards learning. Entry-level behaviour is a key determinant in learning anything and for example, without readiness to learn, nothing can be taught or learned. Hence, we can see a causal effect between readiness and learning.

Terminal and entry behaviour give educators clues about the learner variables and the impact of teacher behaviour. Terminal behaviour is about what learners should be able to demonstrate, the terminal behaviour, for example, is any performance that can be observed or recorded by the teacher and sometimes terminal behaviour is called intended learning objectives. This is a generic term to cover what we call 'there should be a permanent behaviour change' after learning happens.

To be successful in pedagogy, psychosocial and prior knowledge is crucial. As learners construct knowledge (constructionism), before a lesson begins, the teacher must have a clear understanding of the current level of the subject or language she teaches. Students vary according to how they are taught and the way they acquire knowledge—reading and writing abilities are variable and no student can read and write at the same speed as another student.

An interrelation exists between endogenous learner variables and biological, cognitive, and socio-affective factors. These three (3) factors have a causal effect; hence, in LTP, the teacher cannot overlook these variables for they underlie learner engagement, performance and retention of material; however, evidence suggests that much of what happens in the classroom is taken for granted.

Background

The teacher is not the king in the classroom; in a learner-centred classroom, the learner is the king and the focal point and the attention. However, the teacher's role in the 'all-knowing seer' is still in existence. Being student-centric means a change of perceptions about the whole process

of teaching and learning. As it seems, that teachers do not consider learner variables: age, attitude, aptitude, intelligence, motivation, prior learning, the current level of learning, entry behaviour and terminal behaviour. Educating the young mind is no easy task, the teacher is required to be professionally qualified in educational, child, developmental, adolescent, and general psychology and be seasoned in key concepts. However, the professional behaviour of teachers is questionable if they do not possess basic principles of educating the young mind; teaching encompasses a variety of psychological variables and these variables are not given any consideration when some teachers teach. In LTP, biological, cognitive, and socio-affective aspects should be considered because when learners are in their formative years, they cannot grasp concepts that are beyond their understanding. Hence, the consideration of these factors forms the research problem of this study.

Problem Statement

Teaching is a science. Some consider it as an art as well. Teaching entails, among other things, considering complex factors that affect learning. To be successful in the class as a teacher, one needs to be aware of learner variables. Mere teaching is unlikely to help students, instead, a methodology based on scientific inquiry and good practices of delivery is necessary. In helping learners realize their goals in education, the role of the teacher must be professional; in becoming a catalyst in the classroom, the teacher must know what other lateral variables affect learner behaviour. Piagetian stages of cognitive development are central to teaching and we, as teachers, need to be knowledgeable about these stages—in every classroom, learners are at their stages of development, and learning happens according to the stages of development. These stages are the pillars of child development and teachers must consider other lateral variables.

Significance

As there has not yet been any published research that describes the effects and issues of learner variables, this investigation is conducted. Some studies on motivation have been done, however, a study investigating learner and teacher variables in Sri Lanka is needed and this study fills the gap.

Review of Literature

Endogenous variables have been researched. Such variables are not usually considered and teachers tend to overlook them for some teachers are

unaware of them while others consider variables to be irrelevant—especially in teaching a language, endogenous and exogenous variables must be considered as they play a role in learning.

Sripan & Sujivorakul (2020) argued that “intention to persist can be affected by various variables which may be internal or external to the student” (p.18). Lan, Brinton, Yang & Chiang (2017) stated that “it is worth mentioning the similarity between our characterization of engagement as a latent variable in the learning model and the input gate variables in long-short term memory (LSTM) neural networks” (p. 68). This research has a quantitative approach to data analysis and they have scientifically looked at learner engagement. Cakir, Erdogan&Karademir (2018) believed that “more than one variable affects learning. Showing that those variables are interrelated is important” (p. 166). Bakir (2019) surveyed the maternal and paternal educational status of learners as a variable and concluded that “when the variables were examined, it was seen that there was no significant difference based on the maternal/paternal educational status variables” (p. 600). Pfenninger (2017) investigated individual differences and age, and he concluded that “I would thus argue that the broader social environment in which learning takes place seems to be more influential than the cognitive state assumed to be a characteristic of the individual” (p. 40). In bilingual education, as in L2 education, variables affect learners’ learning. In their survey, Santana, García-Santillán, & Escalera-Chávez (2017) observed that “understanding the variables which really [sic] make a difference in language learning is necessary in order to use resources more effectively and to reach a country’s goals for bilingual education” (p. 139).

Learners attitudes affect behaviours. Research insight too supports this. In an investigation conducted by Swatevacharkul & Boonma (2020), they reported that “clearly, attitudes relate to behaviours which then affect actions. Focusing on the relationship of attitudes to a variety of variables, it is possible to seek understanding on human functioning” (p. 177). Teachers’ knowledge of classroom teaching has an impact on the achievement levels of students. To facilitate student learning, teaching skills alone may not help teachers—in addition to teaching skills, teachers are required to possess a good understanding of psychological variables; if the teacher does not know psychological variables, her teaching may not help learners; they are in their formative years, they should be taught considering variables. Trigwell’s (2020) research focused on the scholarship of teaching and found that “if teachers are

more knowledgeable about teaching, they might, on average, be expected to teach better and to facilitate better student learning" (p. 101).

Approaches to teaching have also been conducted. Teaching approaches are essential methodological knowledge and practising teachers are expected to use good teaching approaches. At times, learners tend not to understand what their teachers teach—because the teaching approaches are not in line with the developmental stages of children, lessons may become unsuccessful, boring, difficult, or even out of topic to some learners. “An interesting issue in recent research has been the stability of approaches to teaching: do teachers always teach the same way or does the approach to teaching vary from one context to another?” (Stes, Gijbels&Petegem, 2008,p.257).

Ualeshi (2018) in her research,added that “given that teachers’ attitudes are fundamental to what goes on in the science classroom, an investigation into teachers’ attitudes at a local level is worthwhile" (p. 37). In this article, the writer (ibid.)further elaborated on the need for research in teacher variables as well.Nevertheless, her research is into the variables of teachers teaching science—her research focuses on the impact of teacher variables and their role in TLP.Senol & Akdag (2018) too researched teacher variables and reported that “motivation is related to many variables in the individual’s internal and external world" (p.9). Similar studies of Tabuk (2018) and Kaya (2019) have returned similar results.

Research Method

I used a mixed research method for conducting this study. As I wanted to analyse data statistically, a survey method was used. In addition to the questionnaire, interviews were conducted to gather some qualitative data also.

Research Questions

The following research questions are addressed in this paper.

1. Do the teachers consider endogenous variables?
2. Do the teachers consider stages of child development when they teach?
3. What is the role of learner variables in teaching?
4. How do learner variables affect learning?

5. Do learner variables of male and female students have the same effects?

Aims and Objectives

This investigation focused on examining what type of variables affect teaching. These aims are achieved through the attainment of the following objectives.

Objectives

In the survey, the objectives intend:

1. to investigate the type of endogenous variables that affect the learning of students
2. to identify the role of exogenous variables in teaching
3. to investigate if teachers consider lateral variables in teaching
4. to outline the role of developmental stages of children and how they affect learning in the classroom.
5. to list the learner variables and recommend suitable methods of teaching learners

Analysis of Data

In this section, an analysis of data is presented.

Chart 1 Analysis of Teacher Responses

Findings

As it is evident from the analysis, motivation (Question1), being an endogenous variable received 10% while 'are the students active? (Question2)' received 30.3%. Question 3 received 17.5% of the responses. Question 4 received 30.2% and the involvement of students (Question 5) in the class received 12.2%. Question 6 received the highest number of responses (34.1) followed by 23.2 (providing multisensory experience). Question 9 received 21.1 and the final question received 22.2%. The difference between the highest and the lowest percentages is 24.1% which was a significant difference.

Recommendations

By way of recommendations, I suggest the following. It is not exhaustive but these recommendations are practical and easy to implement in the classroom.

1. Shift your focus from you (the teacher) to the student.
2. Promote learner autonomy and independence in every lesson.
3. Place the responsibility of learning in the hands of learners.
4. Give your students their voice and choice in the decision-making process as to what they should learn and how they learn. Intervene briefly if your support is needed.

Limitations

This investigation was conducted in the Sri Lankan school context where education norms and cultural variables are unlikely to be the same as those in other countries and contexts. The sample consisted of 20 participants and it is a limitation of this study.

Directions for Further Research

A comprehensive research study is needed to document the effects of learner variables. A separate study involving a large sample (at least 30 teachers) is also needed. This study did not cover all the variables of learners as well as teachers, hence a full survey is needed before we generalize the findings of this investigation.

Conclusion

Shifting focus from the teacher to the learner helps learner autonomy and independence. Let the learner take a more 'active role'. Be you are a school, university, or technical college educator, the development of student-centred learning will help the learner become more independent, accountable, and eager to learn - promote more positive interaction whenever and wherever it is possible. Teach the learner how to learn. Do not give your learners fish, instead, teach them how to fish.

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