



Conceptual Article

Application of bioecological systems theory to higher education: Best evidence review

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Urie Bronfenbrenner's bioecological theory is an important model to illustrate the complexity of reciprocal interactions between growing persons and their multilevel socioecological milieus. In higher education, students' achievement may be similarly affected by manifold bioecological systems. The applications of this holistic theory have been widely considered in higher education across the world, but it seems that a simplistic reductionist approach is popular in higher education of Ethiopian to determine educational outputs. The objective of this article is, therefore, pertaining partial application of Bronfenbrenner's bioecological model to higher education with an intention to surpass students' learning. This theory may offer useful theoretical frameworks and practical implications for practitioners. Thereby, they could demonstrate comprehensive maneuvers to successfully handle multilevel socioecological factors that counteract students' learning. Although it is very challenging to apply bioecological theory in a complete manner, implications of key concepts such as a person, microsystem, mesosystem, exosystem, macrosystem, and chronosystem variables have been discussed.

Keywords: Application; Bioecological; Systems theory; Higher education; Evidence-based

I. Introduction

Higher education apparently requires a thorough understanding and the persistent examination of the complex settings in which students' learning takes place (Kruss, McGrath, Petersen, & Gastrow, 2015). Along with this view, there has been growing interest in higher education to support national projects via producing qualified manpower in Ethiopia (Gebru, 2016; Ministry of Education, 2015; Saint, 2004; Semela, 2014). There is also a great tendency to improve the quality of higher education through continuous institutional evaluations, increasing financial expenditure and frequent system restructuring (Adamu & Addamu, 2012; Feleke, 2014; Jimma & Tarekegn, 2016; Molla, 2014). Although these initiatives may have contributions to students' achievement, yet the comprehensive and dynamic multilevel socioecological approaches have been less considered. Extensive educational stakeholders largely rely on a simplistic reductionist model. For example, the accountability to produce well-qualified graduates is more likely oversimplified and seems to be the responsibility of a few authority figures such as government or higher education institutions (Ministry of Education, 2015). As a result, it is crucial to hypothesize a comprehensive and holistic model for better students' learning and quality of education in Ethiopian higher education.

In the oversimplified reductionist model, students' learning and quality of education are basically seen as a simple task that could be brought through one or a few of the educational endeavors, such as with students or curricula. Although, there were pieces of evidence that assert educational settings are very complex, (Jacobson & Wilensky, 2006; Roseth, Johnson, & Johnson, 2008; Wilder, 1981), relying on a linear and simplistic model seems to be more familiar in today's Ethiopian. This viewpoint can be one of the threatening factors that could seriously challenge higher education's effectiveness. In fact, Semela (2014) attested that the Ethiopian education system has been experiencing complex challenges from long-term epistemological, social, economic, and political spheres. These pitfalls can be explained in terms of insisting merely on simplistic linear models such as widening the access to higher education, high rate of enrolment and mass education, harmonizing curricula, enriching educational infrastructures, increasing financial expenditures, and increased share of private sectors. Of course, scientific pieces of evidence indicate that this simplistic model fails to consider the complex and dynamic natures of educational outcomes (Roseth et al., 2008; Yigezu, 2013). Several students' personal

characteristics, multiple socio-ecological systems may be required to fully understand to determine students' learning outcomes in higher education.

In today's dynamic world where education is to be offered in ubiquitous environment (Zhang & Maesako, 2009), and the primary objective of education is acquainting students with 21st-century skills such as collaboration, critical thinking, creativity and communications (Dass, 2014) the motivation to conceptualize a holistic model that would suit to higher education seem very crucial. In fact, four decades ago, Wilder (1981) frankly recognized the importance of complex bioecological systems that influence students' learning in higher education. Consequently, in most parts of the world, researchers and policymakers have largely relied on this holistic bioecological system to investigate education outcomes and make administrative decisions (Jacobson & Wilensky, 2006). But, the pattern to rely on this comprehensive and complex dynamic model is more likely unnoticed in Ethiopian higher education. For example, every time students are assigned to accomplish the given syllabus, the practices of reviewing the existing school systems and revisiting factors that determine students' learning is apparently low (Jimma & Tarekegn, 2016). Mainly, the wisdom of how to manage students from diverse socio-linguistic backgrounds and enable them to successfully achieve educational goals should be entrenched within the comprehensive bioecological model for younger Ethiopian universities.

The rise of international mobility and cultural issues are also among the topical concerns of today's higher education that further increase the diversity of students (Iatagan, 2015). This diversity requires a great deal of attention to the students and biosocial contexts of higher education. But some academicians have yet less psycho-pedagogical skills to meet students that have different needs and maintain individual differences (Fry, Ketteridge, & Marshall, 2009). To ensure that students from different socio-cultural backgrounds achieve the central goals of higher education, stakeholders should put into consideration the complex systems of higher education that determine students' learning (Kruss et al., 2015). Therefore, teachers, researchers, leaders, and policymakers are sincerely required to be conscious enough of how complex bioecological systems influence students' learning and quality education in higher education.

Several attempts have been made to widely apply the bioecological model into certain disciplines such as early childhood care and education (Swick & Williams, 2006) and child maltreatment (Pittenger, Huit, & Hansen, 2016). The application of this model is not yet largely focused on students' learning in higher education, which notifies us that the complex higher education settings demand more attention (Weisner, 2008). Pertaining to bioecological system theory into higher education may enable us to consider several socio-ecological systems that may affect students' learning. Therefore, the main purpose of this review is to provide insights into how the bioecological system theory could be applied to Ethiopian higher education.

2. Theoretical Frameworks

2.1. Bioecological Systems Theory

Bioecological systems theory has been in its evolutionary stage through periodic revision until the death of Bronfenbrenner in 2005 (Weisner, 2008). This theory can reasonably contribute to our understanding of how human development is shaped by the complex systems in which a person grows, and shape the socioecological environments in reciprocal (Bronfenbrenner, 2005; Johnson, 2008). Bronfenbrenner (1979, p. 3) defined human development as "a lasting change in the way in which a person perceives and deals with his environment". This demonstrates that human development is the result of both personal characteristics and ecological functioning. This theory is one of the contemporary theories that typically challenged the classical debates over the primary importance of nature versus nurture issues to determine human development (Bronfenbrenner & Ceci, 1994; McGue & Bouchard, 1998; Moore, 2013). It argues that human development is primarily determined by the individual's genetic blueprint and multilevel sociocultural variables (McGue & Bouchard, 1998; Moore, 2013).

Unlike many of the 20-century psychologists that often relied on the classical reductionist tradition—either only in the role of nature or nurture, Bronfenbrenner (1979) emphatically argued human development is shaped by the individual's interactions with complex multilevel dynamic socioecological systems. According to this theory, the growing person is nested at the innermost center of the ecological systems. Supposedly, this theory accentuated that the characters of the child to have a bearing on the proximal interactions within socio-ecological systems in which she or he grows (Bronfenbrenner, 2005; Tudge, Mokrova, Hatfield, & Karnik, 2009). As a matter of fact, an individual affects one's own development in five ways: (a) controlling one's own

behavior, (b) coping successfully under stress, (c) acquiring knowledge and skill, (d) establishing and maintaining mutually rewarding relationships, and (e) modifying and constructing one's own physical, social, and symbolic environment (Bronfenbrenner & Ceci, 1994, p. 569).

The initial monographic script of Bronfenbrenner was composed of four famous socioecological systems that widely captured the attention of scholars. These were microsystem, mesosystem, exosystem, and macrosystem (Bronfenbrenner, 1979). Later, he added the fifth system associated with the socio-historical passage of a developing person, which is known as chronosystem (Bronfenbrenner, 1986, 1995; Bronfenbrenner & Ceci, 1994). Hereunder we presented the overview of these five Bronfenbrenner's bioecological systems theory.

1. The microsystem is a single immediate and face-to-face environment that contains a growing person (Bronfenbrenner, 1979, 1993). This system is the innermost social system that consists individual's immediate setting in which he or she actively involves in it. This system promotes a vigorous bidirectional relationship in which a growing person's behavior is shaped by the environments and shapes the environments in reciprocal.
2. Mesosystem is the second innermost social ecology that involves the interconnections and processes taking place within the microsystems. Bronfenbrenner (1979, p. 209) defined mesosystem as a "set of interrelations between two or more settings in which the developing person becomes an active participant". For instance "events at home can affect the child's progress in school and vice versa" (Bronfenbrenner, 1986, p. 723). This system involves the relationship between the home and the schools, the workplace and the school, decision making by parents and teachers, and similar variables (Bronfenbrenner, 1993). It also occurs in the settings where their parents live such as parents' world of work, friends and social networks that could have positively or negatively affect the development of the child (Bronfenbrenner, 1986).
3. Exosystem can be explained as a system "consisting of one or more settings that do not involve the developing person as an active participant, but in which events occur that affect, or are affected by what happens in that setting" (Bronfenbrenner, 1979, p. 237) that indirectly affect a developing person (Tudge et al., 2009). It can be further explained as "the linkages and processes taking place between two or more settings at least one of which does not contain the developing person but in which events occur that indirectly influence... developing person lives" (Bronfenbrenner, 1993, p. 42). In this system, a developing person has no active role and direct interactions with the social ecology but affected by elements in the system. Exosystem variables such as family's workplace, social media, mass media, and friends of the family can affect a developing person's experiences. For example, a mother might get a promotion that requires more travel, which might cause conflict with a husband. Obviously, this may change a pattern of attachment a mother has with a child, which might seriously hurt the psychosocial development of a child (Hoskins, 2014).
4. Macrosystem is defined in terms of "consistency observed within a given culture or subculture ... and any belief systems or ideology underlying the community" (Bronfenbrenner, 1979, p. 258). It further "consists of the overarching patterns of micro, meso and exosystems characteristics of a given culture or subculture, with particular reference to the belief system, bodies of knowledge, material resources, customs ...broader systems" (Bronfenbrenner, 1993, p. 40). The macrosystem involves the broader culture and ideological worlds, belief systems, societal values, political trends and community's practices as powerful elements in a child's development (Swick & Williams, 2006).
5. Chronosystem, which was added later to the ecological system theory, can be explained in terms of "the influence on the person's developmental changes (and continuities) overtime in the environments in which the person is living" (Bronfenbrenner, 1986, p. 724). This system focuses on the life transition of a growing person with the passage of time and the socio-historical circumstances of the given community (Tudge et al., 2009). This system involves the ontogenetic and phylogenetic personal characteristics and the environment changes in which a growing person lives. Such chronosystem variables can involve family structure, socioeconomic history, place of residence, employment and ability in everyday life (Bronfenbrenner, 1993).

The bioecological theory is guided by the Process-Person-Context-Time model as a force that determines human development (Bronfenbrenner, 1995; Bronfenbrenner & Morris, 1998; Tudge et al., 2009; Weisner, 2008). Indeed, a process can be described as the functional relationships between both the environment and the developing g person (Bronfenbrenner & Morris, 1998). A person, in this theory, refers to the roles

personal characteristics of developing persons such as age, sex, thoughts, needs, personality, and appearance can play within the given social ecology (Tudge et al., 2009). A context refers to the five ecological systems in which a person grows. Last, the concept of time refers to transitional and socioeconomic events happened to a child over a period of time (Bronfenbrenner & Morris, 1998). Having recognized that the bioecological theory is an important model to explain human development, we favored applying this theoretical framework to students' learning in higher education. The subjective understanding of the bioecological model could be, therefore, very beneficial for teachers, leaders, policymakers, and students of higher education to create better learning environments.

2.2. Nature of Ethiopian higher education

The quality of higher education is a complex phenomenon that can be affected by various social and historical practices such as academic habits, discourses, educational policies, and social values of the given community (Beer & Lawson, 2017; Jacobson & Wilensky, 2006). Harmoniously, there would be a number of possible factors that could affect higher education in Ethiopia. Truthfully, the Ethiopian education system had long been held in religious traditions and higher education began in the mid-1960s (Ministry of Education, 2015; Semela, 2014). The majority of Ethiopian universities and colleges are at their infancy stage and need good foundations at outset for future effectiveness. Particularly, over the last two decades, rapid expansions of higher education and restructuring systems have been made to meet the intended national goals (Feleke, 2014; Gebremeskel & Feleke, 2016; Gebru, 2016; Molla, 2014). Despite these efforts, nowadays, the quality of education in general and higher education, in particular, become a hot subject of concern among the stakeholders in the country (Ministry of Education, 2015).

As a matter of fact, pieces of evidence show that maintaining the quality of education with massive expansions at a time could be very challenging (Molla, 2014; Saint, 2004). To cope with this challenge, there have been recent endeavors to implement quality control and improvement programs in public schools (Adamu & Addamu, 2012; Ministry of Education, 2015). Further initiatives that have also taken to improve the quality of higher education including: harmonizing curriculum for the majority of the undergraduate programs, adopting a modular approach for course delivery, enhancing active learning, and equipping libraries and laboratories (Jimma & Tarekegn, 2016). In spite of all these efforts, yet it has remained a very challenge to enable students to successfully achieve the curricula in a proper way. For example, in the field of physics and engineering students' achievement was reported to be very low and the graduation rate was as low as 79% (Ministry of Education, 2015). For this crisis, a justification was given in an oversimplified linear approach as follow:

This perhaps implies a low quality of instruction or perceived the low relevance of the higher education courses being offered. It could also be a reflection of the low quality of students introduced to higher education, who, irrespective of teaching quality have not been prepared for learning at this level (p. 24).

Presumably, this is just one of the iceberg tips that reveal a simplistic reductionist approach to conceiving what caused the students' low achievement in higher education. To some degree, it is convenient to agree that the educational programs should be revisited instantly and updated along with the changing demand of society. But reducing the causes of students' low academic scores to unsophisticated simplistic linear approaches such as students' competence and quality of curriculum may be convincingly incomplete. To clearly understand the complete pictures of students' achievement, it requires a sound understanding of the natures of students and the comprehensive higher education milieus in depth. The students' low academic scores in such physics and engineering disciplines would be, therefore, understood from a holistic bioecological theory.

In this view, students' learning shouldn't be decontextualized from the social ecology of higher education and educational outputs in higher education shouldn't be merely ascribed to students' competence and quality of curricula. As a result, it would be no surprise if this compelling linear model, which Jimma & Tarekegn (2016) criticized as a centrally designed one-size-fits-all approach, failed to meet students' demand and bring envisaged educational outcomes. At this point, it is very important to pose some guiding questions such as (a) Why a competency of students becomes a concern in higher education? (b) Why curriculum designed a few years ago by experts appeared to be less relevant? (c) What has been missed in higher education in Ethiopia? (d) What measures would be taken to overcome the current limitations? In general, this investigation's core objective is to deal with these inquiries from bioecological perspectives.

3. Procedures

Over last two decades, many positivist and post-positivists fragmented research trajectories have been reconnoitered to determine factors associated students' learning and to suggest realistic directions that could be used in higher education of Ethiopia (Adamu & Addamu, 2012; Feleke, 2014; Gebremeskel & Feleke, 2016; Jimma & Tarekegn, 2016; Molla, 2014; Yigezu, 2013). Given that there are research findings indicating the clear gap in the quality of higher education, in this scrutiny, we chose to rely on a critical postmodernism approach to manage several uncertainties. Based on empirical-rational approaches to change (Chin & Benne, 1969), we preferred to question the existing simplistic reductionist practices and call for an alternative comprehensive approach.

To achieve this goal from bioecological perspectives, the manuscripts of Bronfenbrenner and his colleagues from 1979 to 1998 have been collected. Finally, six renowned manuscripts were used in these reviews (Bronfenbrenner, 1979, 1986, 1993, 1995; Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Morris, 1998). Having skimmed through the manuscripts, six potentially applicable areas of the bioecological model have been identified. The person, microsystem, mesosystem, exosystem, macrosystem, and chronosystem were identified as systems that could affect the quality of higher education.

4. Application of Bioecological Model

The purpose of this study is to understand why education quality is becoming a serious concern in higher education of Ethiopia from bioecological perspectives. From these points of view, the main reason could be a selective reliance on a few variables and ignoring holistic approaches to educational systems. Particularly, it seems that a vast number of bio-elements and its complex interactions within multilevel ecological systems have been unnoticed. For example, the bio elements such as the meaning of life, personal values, peer influence, substance abuse, physical and mental health status, family cases, and the other personal cases are less considered in educational systems. The higher education ecological systems such as campus contexts, teacher-student relationships, technology, leadership styles, political decisions, educational resources and the like also seem not well considered. Therefore, all personal, social and ecological variables should be carefully and enthusiastically take into consideration besides the quality of curricula and students' competence. Mainly considering higher education's educational outcomes as a mere result of students' competence and overall quality of curricula should be seriously challenged. Indeed, a holistic approach that emphasizes the proximal and active interplay between students and their socio-ecological systems would be emphasized. Along with this assumption, we made attempts to apply the key elements of bioecological systems theory to higher education of Ethiopia.

4.1. The personal/bio level

Bioecological systems theory provides a useful theoretical framework to understand students' characteristics in higher education. Particularly, the bio elements of the bioecological theory would be given special attention to understanding students at the individual level. Students' personal characteristics such as students' level maturation, career interest, health conditions, disability, major life-events, ability, sex, religion, learning styles, and similar variables would strongly be considered as determinants of educational outcomes in higher education. For example, the majority of undergraduate students' age category belongs to emerging adulthood that commonly associated with the promising and perils of psychosocial aberration (Barlett & Barlett, 2015; Henin & Berman, 2016). As a result, students might be susceptible to antisocial behaviors and psychosocial problems such as stress and depression (Allem & Unger, 2016; Bowker, Stotsky, & Etkin, 2017). Mainly, this stage is critical to begin substance abuse and plan for future consumption, which has an unequivocal influence on their health and academic pursuits (Duijster et al., 2017; Glowacz & Schmits, 2017).

In this regard, a safe, substance-free and supportive environment is fundamental to maximize students' academic achievement and health conditions. In higher education, being a better model for students, mobilizing against substance uses, engendering effective coping with peer pressures, and creating vibrant and stimulating school environments may maximize students' physical and mental health fitness. In addition to health and emotion-related issues, career choice is also believed to play a vital role in students' achievement motivation and academic success (Igere, 2017). In Ethiopia, experiences show us, students predominantly choose academic careers purely for prestige, but not the career they want for professional development. If graduates of preparatory schools with relatively better academic backgrounds are selected randomly and given the

opportunity to choose their own career of interest, nearly entire students would likely make their first choice of medical sciences. This is because it is only this career that has a better socioeconomic value. For the reason that it is impossible to manage such career choices, every year, most students have been assigning to certain programs by the Ministry of education against their interests.

As a result, many students often drop out of school because they no longer find it relevant to their lives or they cannot fit the given program. This is probably the case that has happened to the physics and engineering classrooms of Ethiopia. In a situation where the majority of students are unable to join a career of one's own interest, it is important to be skeptical about the success of students. As we often observe in our dealings with students, a few students from better socioeconomic families immediately drop out of the centrally assigned program, if not compatible with their needs, and look for alternative programs in private. Students from the lower socioeconomic level would remain in the program but may show lower motivations, low efforts, and poor achievement. Indeed, it would be a big assignment to expand students' choices and maintain the primary career choices of students, which may increase their achievement motivation and better educational outcomes (Yunus, Osman, & Ishak, 2011).

Whilst the early 19th century scientists believed that traits such as intelligence and personality are determined by biological blueprints (McGue & Bouchard, 1998; Moore, 2013), there were also pieces of evidence that show social ecology has tremendous power to determine these variables (McGue, Bouchard, Iacono, & Lykken, 1993; McGue & Bouchard, 1998). Hence, sticking to the idea that students' academic achievement is primarily determined by intelligence by itself is problematic. If it is considered as the most important predictor of students' success, it may cause undesirable label students based on test performances and develop an unrealistic expectation of students (Weber, Rücker, Büttner, Petermann, & Daseking, 2015). In addition, it may cause a lack of focus on the wide-ranging socioecological variables and personal characteristics of students in academic contexts. Perhaps, giving less credit for the socio-ecological and personal characteristics of the students may result in lower academic success.

The supplementary bio level elements that could have profound effects on students' college success are major disabilities and linguistic backgrounds. Students with a major disability often experience academic difficulties in a formal education that require special supports to address their difficulties (Reilly & Neville, 2011). Therefore, special attention ought to be given to address the legitimate needs of students with the disability. Regarding students' linguistic background on the current academic status, it may affect students' academic accomplishment especially if it is not a mother tongue. The sex of the individual is also believed to have some educational implications for college students. For example, in higher education, women are likely to experience more peer pressure than men students (Geven, Jonsson, & Tubergen, 2017), which may lead to various anti-social behaviors. In addition, female students perceive themselves more fearful than males that may cause stress and test anxiety (Volková & Dušková, 2015) and prone to depressive symptoms (Mondi, Reynolds, & Ou, 2017). Unlike a trend in developed countries that females academically outperform males, less likely to drop out of school, and score higher grade point averages, (Geven et al., 2017), in Ethiopia, female students often fail to fully utilize their potential for academic works and experience high degree of academic incompetence (Molla, 2014). Therefore, one of the key issues in strengthening higher education would be empowering female students. Furthermore, male students usually lack adherence to school rules and norms compared to female students (Geven et al., 2017), which requires tolerance, supportive guidance, and plausible monitoring.

Although it is rather controversial to align teaching strategies along with students' learning styles (Tulbure, 2012), students from diverse social and cultural backgrounds must be sincerely respected, and their needs should be met using varied forms of technological and conventional learning experiences (Balakrishnan & Lay, 2016; Yunus et al., 2011). According to scientific evidence, learning style has the potential to affect students' intelligence and overall school achievement (Weber et al., 2015). It is therefore important to have a clear understanding of students' learning styles, even for students with a low IQ to have a positive impact on their success. Additionally, we would like to consider how major life-events and current religious affiliation of students could affect their academic outputs in higher education. Major life events, such as the loss of a loved one, parental divorce, serious injuries, accidental disability, disease, or the like often lead students to a great deal of anxiety and frustration. This may eventually result in poor academic results. As a means of coping, every student would deserve special attention regarding major life events that occurred to them and treated accordingly.

Although it does not seem to have any impact on the students' academic pursuits by itself at a glance, religious practices and rituals have an effect on educational outcomes (David et al., 2017). For example, some students celebrate religious rituals on Friday, others on Saturday and yet others on Sunday. Since these practices may not be compatible with students of different religious groups, working in a team and a delicate agreement with others may be very challenging. This may even cause stress and depression, particularly on minority groups over a period of time, which might reduce students' academic achievement. Frankly speaking, to improve the quality of higher education, we need to take into account manifold experiences of students such as the biological situations, development-related changes, career choices, disciplinary issues, emotional state, sociological factors, economic status, physical and mental health conditions, states of addictions, and their immediate learning environments.

4.2. The Microsystem level

In higher education, the specific microsystem level elements that have potential effects on students' learning outcomes involve peers, educational and supportive resources, teacher-student relations, leisure times, teaching methods, family and the like. These variables could have a substantial contribution to students' emotional state, cognitive ability, and health behaviors, which may in turn trigger students' academic weakening (Duijster et al., 2017; Weber et al., 2015). For example, peers can exert a powerful influence on college students' academic habits and career development, especially for females (Geven et al., 2017; Glowacz & Schmits, 2017). Furthermore, microsystem elements such as the medium of instruction, teaching-learning approaches, relations with other students, library services, cafeteria services, dormitory services, clinical services, students' guidance, and counseling services, and similar collective variables can powerfully determine students' learning. To properly manage the microsystem level variables, entire educational stakeholders and policymakers should put these factors virtuously into account. The educators should also be courageous to comprehend the current circumstances of the student, use language that would fit students' understanding, apply varied teaching experiences, conduct diverse assessment methods, use diversified academic recourses, and develop outgoing and passionate relationships with students.

To begin with a mere student-teacher relationship, students may function differently in different social contexts, even, until the changes of biological states to adapt to the local circumstances (Moore, 2013). Perhaps this is why Walker & Gleaves (2015, p. 65) stated "good teachers and their teaching matter". Teachers' classroom behaviors can meaningfully affect students' learning and emotional well-being. For instance, students who are better able to interact with teachers would be less likely to show unintended behaviors, such as smoking and alcohol (Hong, Lee, Grogan-Kaylor, & Huang, 2011). Though it has remained slightly argumentative (Walker & Gleaves, 2015), caring teaching, a friendly relationship, supportive mentoring and a relaxed classroom atmosphere often associated with successful academic results (Wilson & Devereux, 2014; Yunus et al., 2011). In fact, a caring aspect of teaching is more likely snubbed in the educational system across the world (O'Connor, 2008). In Ethiopian higher education, therefore, unbending patriarchic and authoritarian traditions should be modified to caring and supportive conditions to make students feel safe. It is because of the better relationship between teachers and students is, the better students experience academic performance and healthy personality (Hong et al., 2011). Therefore, creating a conducive, friendly, and supportive learning environment could improve students' achievement motivation and engagement in learning processes (Walker & Gleaves, 2015; Yunus et al., 2011).

Either directly or indirectly, family situations could have a stronger effect on the current habits of teens (Hong et al., 2011). Such a parenting style, family structure and situations at a time may also have an effect on the behavior and academic status of teens (Hoskins, 2014). For example, marital conflicts within the family may associate with unpredictable behaviors, hostile reactions toward others and academic implications (Swick & Williams, 2006). Under such circumstances, youths may more likely to become hostile, and both parents and children can be hurt as they cannot easily adjust. Serious accidents, disasters, and death of a family member also likely cause college students' drop of academic status and dropout. Family socioeconomic backgrounds and lifestyles may have also academic implications for college students. Indeed, students from a family with higher socioeconomic status and democratic parenting experience better college adjustments and academic performance (Hoskins, 2014).

Finally, we would like to explain how leisure activities can affect college students' academic careers. It is prominently believed that college students often spend more time on leisure activities than on academic activities and may have an adverse effect on their academic pursuits. Of course, leisure activities have both

positive and negative effects on college students (Moghavvemi, Sharabati, Paramanathan, & Rahin, 2017). A vital question would be, therefore, how to utilize these leisure activities for academic purposes? Higher education should design educative leisure activities that can attract students from different socio-linguistics and economic backgrounds. So, it may likely reduce the negative aspects of leisure activities, and helps the students to make choices, decisions, and priorities to engage in recreational activities.

4.3. The Mesosystem level

When individuals move to new settings, they often experience changes in the mesosystem variables (Bronfenbrenner, 1979). As the mesosystem involves the interactions between two or more variables in the microsystem, the ways these systems interact with each other can affect the academic outcomes of college students. In addition to activities in the classroom students' academic performance can be, therefore, influenced by the interactions of microsystem variables outside the classroom. Such variables can include the involvement of parents in academic activities and the extent to which academic learning is carried out in the students' residents (Hoskins, 2014). Furthermore, a transition from high school to college, the relationships between family experiences and college experiences, college experiences and church experiences, and family experiences and peer experiences may strongly determine students learning. For example, a student whose parents have rejected him at home may find it difficult to develop positive relationships with peers and teachers. A student from an egalitarian society may not be able to easily adapt to rigid classroom management. As a result, informative guidance services should be easily available for new students at the onset of college entrance. The parents of students should also support their students and discuss college issues regularly. Additionally, the present patriarchal classroom features must become democratic and participatory. Efforts should be made to encourage students to cope with new situations and peer pressures before exposing to challenges at the institutional level.

4.4. The Exosystem level

The exosystem is the third innermost level that that would have an effect on college students' academic success. This level variables involve the social systems that do not contain growing persons themselves but affect their experiences indirectly (Bronfenbrenner, 1986). As to Bronfenbrenner, although these variable doesn't involve students themselves directly, the systems may be contributing factors to the students' academic growths. Such exosystem level elements are social networking, family cases, sibling's affair, parental networks, friends and extended family members, companionships, and even financial resources. Although it is very challenging to control these variables instantly, higher education professionals and personnel should be able to sincerely grasp the current socio-emotional conditions of students and treat to the students according to their emotional functioning.

4.5. The Macrosystem level

Events in macrosystem differ from exosystem in that they are a prelude to normative history-graded variables that affect students of certain cohorts. When we focus on this system, we turn our attention from each individual student to a certain generation with shared characteristics. The impact of macrosystem level variables is not affecting only a student but affects students of a certain generation or social class in general. The elements at this level that could affect students' academic pursuits are the curricula, economic status, cultural values, political systems, economic status, technological backgrounds and childcare systems (Bronfenbrenner, 1995). For example, in the countries that demand higher quality childcare systems, students may likely experience favorable socioecological adaptations (Hoskins, 2014). These level variables such as leadership styles, media, cultural costumes, legal procedures, and political decisions can also matter learners' effectiveness in higher education (Smith, Hayes, & Lyons, 2017).

The socioeconomic status of a given community also plays a greater role in predicting students' GPA far more than sex, race, and intellectual resources (Li, Allen, & Casillas, 2017). Li and colleagues further noted that students from low socioeconomic status experience a chronic form of lower academic performance. Particularly, during adolescence and emerging adulthood, the impact of low socioeconomic status on the students' academic performance is more likely severe and associated with recurrent episodes of stress and depressions (Cutuli et al., 2013; Mondri et al., 2017). Therefore, the roles of each macrosystem variable on academic issues of higher education students should be well understood, and interventions must be designed and carried out according to students' needs.

4.6. The Chronosystem level

The chronosystem involves the time perspective variables that can be applied to students' academic development (Bronfenbrenner & Ceci, 1994). There are two ways of how time perspective variables can be applied to a developing person. The first is an ontogenetic change associated with the individual's characteristics. Due to the change in chronology, changes in behaviors are common among human beings. Therefore, age differences and age-related changes should be carefully considered by higher education practitioners to properly manage students learning. These variables involve elements such as developmental maturities and transitions and changes in the family's life courses. The second is the phylogenetic changes that matter how the collective community's characteristics change over a period of time (Moen, 2006). These variables involve war, socioeconomic history, changes in environmental factors, socio-historical circumstances, the increased opportunities to pursue a career for our women, and the revolutionary movements to eradicate illiteracy. As a result, it is indispensable to put chronosystem level variables into consideration, which demands to invest intensively on the new generations and refining the existing educational practices in higher education.

5. Implications

There are three possible dimensions of bioecological systems theory that may pertain to higher educations: a person, socioecological milieu, and time perspectives, which are crucial in understanding students' academic success. This means that the students' academic success is far more than the mere ability of students and the qualities of the curricula. Indeed, students' academic success in higher education is often multi-facetious and can be explained by proximal multidirectional interactions of students with various socio-ecological variables over a period of time. What could we do with a biological model is, therefore, to enthusiastically understand the complete picture of students' current biosocial characteristics, their proximal processes within the multileveled socioecological systems, and their socio-historical characteristics. In this way, we could apply a holistic approach to higher education, which has been missed in the simplistic linear model.

In the future, responsibility shouldn't be designated to only specific educational stakeholders to maintain quality education. Instead, all the students themselves, educators, educational leaders, policymakers, public media, political leaders, social values, cultural practices, socioeconomic status and historical backgrounds of the community are responsible together to determine the quality of higher education and students' academic success. Therefore, this model may able to bring entire educational stakeholders together to work collaboratively on the multilevel socioecological systems that range from an individual student to the broader historical background of a country's educational systems. Unless special efforts would be made to integrate each level of the bioecological systems theory elements into educational policies and practices at higher education, ensuring the quality of education might not be warranted. Explaining that it is the limitation of this paper to fail to apply bioecological theory in a complete way, we would finally suggest further research investigations that address the implications of each bioecological system theory component in depth.

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