Asian Journal of Education and Social Studies

Volume 50, Issue 6, Page 523-533, 2024; Article no.AJESS.117810
ISSN: 2581-6268

Students' Growth Mindset: Potential Asset in Fostering Educational Equity

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/ajess/2024/v50i61429

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/117810

Review Article

Received: 24/03/2024
Accepted: 28/05/2024
Published: 02/06/2024

ABSTRACT

Over the decades, schools have been facing the challenges of organizing lessons and making available equal prospects for students with diverse needs. This is so because students enter school with a wide scope of individual differences as a result of the multifaceted relationship between unequal environmental situations and genetic dispositions. The diverse sets of socioemotional characteristics and cognitive skills students entered formal school with determine how fast and how well students will learn. The capacity of schools to manage student heterogeneity will influence the provision of equal opportunities and the capacity to promote educational equity. Many existing or proposed interventions of policymakers and educators fail because they do not account for a learner's contextual realities, such as structural and systemic barriers (poverty and marginalization). So, educational outcomes remain unequal within and across nations. Students' mindsets have been acknowledged as a potential prise for making academic outcomes more equitable. Research studies have identified two broad ways the mindset culture can be communicated by teachers. This paper distinguishes between different notions of educational equity, reviews the empirical and theoretical mindset culture and examines its potential to reduce group-based inequalities in education.

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Cite as: *Ayoola , F. W., & Ibrahim , A. (2024). Students' Growth Mindset: Potential Asset in Fostering Educational Equity. Asian Journal of Education and Social Studies, 50(6), 523–533. https://doi.org/10.9734/ajess/2024/v50i61429*

Keywords: Education equity; growth mindset; socioemotional characteristics; interventions; cognitive architecture.

1. INTRODUCTION

In developed countries, people's livelihoods reflex to a large extent their educational attainment. Higher earning in labour market as well as a secure employment are parts of benefits of education. The benefits of skills acquired through education also include greater civic involvement [39], higher life fulfilment [51]. Healthier living [38] and lesser criminal conduct [40]. These essential benefits of education are pointer to the fact that unequal education can promote unequal outcomes in the society, especially between different groups in society. Educational achievement and attainment is highly unequal across and within many nations of the world [28]. Large and importunate socioeconomic differences in academic attainment were reported throughout the 72 countries examined by international assessment in 2015 [49].

The diverse sets of socioemotional characteristics and cognitive skills students entered formal school with determine how fast and how well students will learn. The capacity of schools to handle student diversity will influence their capacity to provide equal opportunities and to promote educational equity. Many existing or proposed interventions of policymakers and educators fail because they fail to accommodate learner's contextual realities. The contextual realities could be both structural (e.g. marginalization) and systemic (e.g. poverty) barriers or either of the two. Consequently, educational attainments continue to be unequal within and across nations of the world. There are different and contrasting concepts of educational equity, how educational equity should be defined has been a subject of thoughtful debates for years [29,37,57,66]. All the school of thoughts agreed that educational equity is a valuable goal, but could not reach an agreement on how it should be defined.

There are different concepts of educational equity. There is 'equality of outcome' concept. This concept is premised on the assertion that equity means students coming from different backgrounds achieving equal outcomes such as academic achievement [37,57]. This school of thought argued that educational outcomes help students to access life goods such as income, social status and health [57]. This argument takes root from the manner in which social inequalities in education has been addressed. Social economic status achievement gaps emphasize difference in academic outcomes between students from different backgrounds. This school of thought is countered by another school of thought that believes that ensuring equality of opportunities should be a suitable goal [37]. To define educational equity as equality of opportunity makes it more complex since equality of opportunity itself is a concept with different meaning [57]. Schouten [57] warned that if equality of opportunity is the provision with equal inputs or resources, then the equality of inputs conception will only reinforce unequal opportunities that already existed. Sokolowski and Ansari [59] in agreement with Schouten [57] asserted that different children require different inputs to ensure educational equity.

Another school of thought argued that educational equity should take into cognisance input and output [57,66,59]. For this school of thought, treating individuals unequally by providing more resources to those who are at risk of falling short of achieving adequate outcomes is morally right and acceptable. It follows that input should be provided on need basis to ensure that all students reach a minimum level of educational outcomes. And whatever inequality that exists after the minimum level has been reached is no longer a problem [37,56].

Over the past several decades, psychological researchers have attended to students' fixed mindsets (the belief that intellectual abilities are fixed) as one factor related to educational inequality [21,70]. Fixed mindset beliefs can come from cultural stereotypes about which groups have high academic potential [62], and can in turn sustain inequalities by leading minoritized students to believe that they cannot succeed even with great effort. One possible way to promote more equitable outcomes, then, could be to reduce fixed mindset beliefs by encouraging students to adopt a growth mindset. Growth mindset is the belief that students can meaningfully develop their intellectual abilities, under the right conditions (e.g. effort, effective strategies, and support from others) [21,70]. When students endorse (or are encouraged to adopt) more of a growth mindset, they have been

found to be more likely to engage in learning oriented behaviours that lead to improved educational outcomes [21,70]. This is true among students from structurally disadvantaged groups (i.e., those stereotyped by majority groups or excluded from access to high-quality schooling) and students with a history of poorer academic performance [3,24,71,70,73]. Research studies indicate that growth mindset effects are heterogeneous, varying meaningfully across students and academic contexts [72,6,8]. Researchers have shown that intervention effects are strongest for structurally disadvantage students and low-performing students. It follows that growth mindset interventions has potential for addressing inequalities [27,69]. Also intervention effects are strongest for context that support and reinforce the intervention message [27,69]. Porter et al [50] asserted that teachers could be a high- leverage target for interventions by helping them to design carefully crafted and thoroughly tested trainings that help them to initiate academic contexts that buttress and bolster student growth mindset. Teachers are the primary authority figures in the classroom (e.g. they usually set and execute grading schemes), and therefore their practices have a potent impact on the classroom culture [27,45,26,32,33,65]. The classroom culture is defined as the shared system of beliefs, goals, and norms that define what it means to be a learner in that classroom [10,45,9,36,31,53]. Because research has found that a teacher's mindset culture is associated with the magnitude of the group disparities in achievement in their classrooms [10], it is important for growth mindset research is to develop and evaluate programs that help teachers improve their mindset cultures. Accomplishing this goal will require researchers to address several major conceptual and empirical challenges.

2. THEORY OF MINDSET

Learning outcome reflect learning goals developed by children. It is well known that children developed different learning goals, and in order to enhance their learning outcomes, it is important to find out how they develop different learning goals. In 2020, Dweck and her associates established that our convictions and our identified capacities significantly have influence on our capacity to pass through and benefit from challenges or setbacks we might encounter [69]. Individuals are adjusted to different goals based on different theories about individuals' abilities. The different patterns of behaviour are related to the different goals. From this research, two self-theories emerged and are mapped unto achievement goals. The first is the entity theory associated with a performance goal orientation. The second which is the incremental theory mapped unto mastery goals [20]. These two self-theories were merged together and named Implicit Theories of Intelligence (ITOI). With the understanding that ITOI can be put to use in any aspect of the self, ITOI is currently referred to as Mindset Theory (17).

Human capacity beliefs are categorized into two broad categories in Mindset theory. The categories are fixed mindset and growth mindset. The entity theory of intelligence, now referred to as fixed mindset, depicts the belief that one cannot control his or her intelligence [17]. It reveals itself as the belief that abilities are constant and fixed, and that a person has a fixed amount of potential for a given task. For an individual with a fixed mind set, his/her potential for given task can't change, he or she can't change his/her intelligence. Individual with a fixed mindset view challenges as insurmountable tasks resulting in helpless response pattern, and the situation is interpreted as sign of low ability [17]. For individual with a growth mindset, formally referred to as incremental theory of intelligence, intelligence is not rigid and can grow and develop with effort and experience, not withstanding differences in interest, personality or aptitude [19]. Yeager et al. [72] associated registering for more challenging courses, college retention and high academic achievement with growth mindset. A person with a growth mindset believes he/she can change his/her intelligence. Individuals with a growth mindset use different strategies in learning (adaptive), they stay and persevere on the task since they maintaining positive affect toward the task. Such individual are likely to have a mastery-oriented pattern [20]. Blackwell et al. [3] asserted that students who hold a growth mindset have been found to endorse stronger learning goals and make fewer helpless attributions. Mindsets are domain specific, someone could exhibit growth mindset about his/her biology skill and has a fixed mindset about his/her physics skill skills [17].

Mindsets depend on the specific situation, though it is often conversed as something one has [16]. At different times, everyone has both fixed mindset and growth mindset. People around us, certain event in our life and some circumstances we passed through can influence our mindsets. In a class where the teacher accentuate punitive measure for failure, or home where the parents castigate children for making

mistakes may trigger a fixed mindset [16]. Psychological professions could use the fact that mindset is highly influenced by environment to promote a growth mindset in children throughout their developmental years. Also as children grow, environmental structures (grade), rise in level of self evaluation, increasing social comparison and identity development, may stimulate fixed mindset in student [18]. Costa and Faria [12] affirmed that the degree of relationship between mindsets and academic achievement is strongest in the early teen years. In an attempt to protect their self-images, adolescents with a fixed mindset could reduce efforts geared into academic works. This is as a result of the vulnerabilities associated with early adolescence, coupled with fear of humiliation and increase level of self-focus [17]. It is very important to start early groundwork to facilitate and enhance a growth mindset during children developmental period. It will act as source of motivation for students to invest more efforts in their goals, especially vulnerable students [72].

3. MECHANISMS OF MINDSETS

3.1 Handling Failure

Seeing challenges and failures as independent of their personality or competency, is a manifest of growth mindset. Therefore students with a growth mindset learn from failure, look for help when it is needed, and profit from feedback and mistakes [16]. On the contrary, students with a fixed mindset are afraid of reflecting incompetence, and resist the urge to see prospect in failure [16]. So individuals with fixed mindset see failure as reflection of who they are, and susceptible to helplessness whenever they fail because they believe abilities are static. These kinds of persons react to failure negatively with little or no constructive strategies compared to persons with a growth mindset [75]. The key focus of the individuals with a fixed mindset is principally outcome. In a study conducted by Mangels et al. [41] using EEG technology, individuals completed a task and received the feedback. Individuals with growth mindset exhibited the strongest attentional response when the feedbacks were about whether they are right or wrong, and not when the feedback offered strategies for improvement.

3.2 Effort-based Strategies

According to Blackwell et al. [3] and Sarrasin et al. [55], positive beliefs about importance of persistence and responding to setbacks with effective strategies and increased effort, which are manifest of having a growth mindset about intelligence, predicts high grades in the middle school. Blackwell et al. [3] found that students with a growth mindset improved their mathematics achievement over two years of junior high school compared with students with fixed mindset, when the impact of beliefs regarding intelligence was examined. It was reported that those students with growth mindset showed increased effort-based and effective strategies in response to failure, and this helped their mathematics achievement.

3.3 Bolstering Expectations

Another important component of a growth mindset is beliefs about expectation of success (i.e. expectancy beliefs). A growth mindset can strengthen expectation. For groups of students who hold low expectation for themselves such as low-income students and females in Science, Technology, Engineering, and Mathematics (STEM) courses, a growth mindset intervention can create the context that will motivate these students and help them to achieve academic success. For example, Degol et al. [14] found that high value of mathematic achievement was associated with student's growth mindsets and the growth mindset through the task value as a go between leads to higher STEM career desires. Remarkably, the mathematics achievement score of females and males with fixed mindsets are comparable; conversely, the mathematics achievement grade of females with a growth mindset is higher than that of males with the same mindset. The difference was attributed to females having higher expectancy beliefs than males, it follows that an important factor in mathematics achievement for female is expectancy beliefs [14]. Low-income students like students who face gender stereotypes, because of their life experiences may less likely have positive expectation for success. For such group of students, a growth mindset could reduce the effect of socio-economic status on academic achievement. Claro et al. [11] found that, low-income students with a growth mindset have mathematics and language achievement scores similar to high-income cohorts with a fixed mindset. It was concluded that growth mindset may be safeguard between academic achievement and poverty. More often the impact of mindset on academic achievement is felt mostly by those who are facing challenges, making this area of study relevant for school psychologists that always work with these

students. For school psychologists to be in best position to help these students, it is imperative for school psychologists to comprehend the psychological and behavioural effects of mindsets, and to design interventions using mindset theory.

3.4 Growth Mindset and Human Cognitive Architecture

Understanding the human cognitive architecture is very important in fostering educational equity. There is a compilation of large research h studies over the year in learning science detailing how people acquire knowledge; of importance is how intricate knowledge is gotten hold of beyond the rote learning. The reports of the research studies posited that learning is a substantially a personal and non passive process. It involves the interaction of people with their social environment [5,13,15]. To make meaning of content and to use it to construct logical and orderly mental representation of the content, learners incorporate their prior knowledge [63]. This makes them active receivers of information. Students prior knowledge is domain specific, gotten through earlier informal or formal learning and general cognitive abilities dictates individual students learning potential [59,63]. The prior knowledge in a domain is the basis for acquiring new and intricate knowledge in that domain and it is the most significant predictor of academic achievement in that domain [58]. Tetzlaff, Schmiedek and Brod [67] asserted that differences in students' learning potential changes over time, it is not static. Research studies in psychology asserted that instruction will be effective if students' cognitive characteristics are always taken into consideration during teaching and learning.

If a student believes that his or her academic abilities can be grown (growth mindset), such a student is likely to hunt for demanding prospects that will foster his or her mastery. Such a student will persist on the task when the learning involves mistakes or challenges in the short-time. Also a student that believes that his or her intellectual ability is fixed will not persevere when task becomes challenging, but avoid the prospect and worry that failure would reveal his or her lack of competence. So, students with a growth mindset attribute failure to factors they can control, such as strategies and effort. If a student is more of a fixed mindset, he/she interprets setbacks as lack of potential to do well. In the mind of students with a growth mindset, effort is a tool to promote their growth while fixed mindset students interpret the need for effort as lack of ability [21,69]). A lot of research studies asserted that students' growth mindset beliefs has a positive effect on academic outcomes [21,69,71,72,6,8]. The beliefs about the meaning of effort, systems of goal and attribution emanated from growth mindset beliefs [21,27,43]. Growth mindset belief is simple and powerful, it can be a fruitful target for interventions.

3.5 Effect of Growth Mindset on Self-Regulatory and Socioemotional Needs

Learning involves motivational and social processes, not just cognitive activity [42,4,2]. It is important to always build students' different needs into classroom instruction in an integrative manner. Attention should be constantly given to students' self-regulatory and social need during classroom instruction, because they are always changing. Research studies have shown that students with lower levels of prior knowledge and cognitive abilities are not in charge of self-regulating their own learning process. This type of students needs guidance and instructional support. There is need for precise and unambiguous instruction in self-regulating strategy, so teachers must assist students in self-regulatory skills [22]. Kazemi and Stipek [30] posited that there should be precise and well designed educational technologies which will increasingly develop self-regulatory skills. There is strong evidence that socioemotional needs are mediated through quality social interactions. Learning is a profound social activity in which the learners need a sense of belonging and emotional safety in order to intellectually be part of the learning [2]. Importantly for students from less-advantaged background, success in academic requires that teachers build robust supportive relationships with their students [64].

What teachers overtly or covertly say and do to create a growth versus fixed mindset culture is more important than what they privately believe about students' abilities when it comes to inequalities [27,26,32,33,34,35,65]. Teachers that are of more of a growth mindset will allow students to revise and resubmit their work and explain that their standard is rooted in a belief that all students can learn the task. The students can pick up on the prompt [47,46] and recognize that their teacher endorses a growth mindset. This notion will have an effect on their psychological security or helplessness within the

classroom. Students who perceived that their teacher supported more of a growth mindset reported a greater sense of belonging in the teacher's course when compared to a fixed mindset [45]. For a group that is experiencing a negative stereotype in terms of ability or intelligence, this may be true, since they may fear that these stereotypes may inform their fixed mindset teacher's assumption about which students are capable [60,61]. Concerns about being negatively evaluated and confirming negative stereotypes may be dispelled because the teacher's growth mindset implies that all students can learn and improve. Inequality can be affected by the classroom mindset culture; it could lead to student achievement disparities [10]. Also, growth mindset classroom cultures can also tackle inequalities by providing psychological affordances for students' own growth mindset beliefs [27,68]. Students' mindset belief can prompt learning-orientation behaviours that can make positive academic outcomes easier, making it a potential asset in learning environment [21,43,44,54]. In a fixed mindset classroom culture, going against or weakening the beliefs may be of advantage, because they may less likely guide the students' behaviour within that context and promote learning. When growth mindset beliefs are enhanced and bolstered by the environment, students can benefit more from these beliefs. Students may gain more from learning the growth mindset through intervention activity, when the classroom or school environment is unswerving with the growth mindset message [71,72].

3.6 Considering the Broader Context

The context in which instruction and learning takes place also contribute to educational inequity, students' experiences can vary between and within schools [48]. In many countries, for example in Nigeria, majority of the children go schools nearer to their homes which may mostly result in social and academic stratification across schools. In other countries of the world, the major differences across schools are influenced by tracking and differences in their socioeconomic composition. Therefore, it is customary for students from low socioeconomic background to go to school that is different in quality of education they offer to that of students from high socio-economic background. Also, the population of students in rural or semi urban schools situated in area with large concentrations of economically less advantaged people is higher than schools serving students from high socioeconomic backgrounds. Apart from the population explosion, other issues facing rural or semi urban schools are high number of children with behavioural problems, less qualified teachers and little resources compared to schools serving students from high socioeconomic backgrounds [23,52]. Combined, all these issues made it more challenging to provide quality instruction and learning in rural or semi urban schools. As the level low-income countries strive to increase school enrolment, large numbers of students still do not have basic competencies in reading and mathematics [25]. The schools in low-income countries, particularly in rural areas, are struggling with inadequate physical infrastructure, inexperienced and underqualified teachers, high student-teacher-ratios, high levels of student malnutrition and poverty, high teacher absenteeism and poor educational resources [76,77,78,25,1].

3.7 Mindset Interventions

The essence of mindset interventions is to correct the misconception students have about their brain and to enrich their knowledge on the capacity of brain to grow and develop. And the ultimate aim is promote a growth mindset and finally a positive outcomes (academic achievement) [69]. There are different methods of delivering mindset interventions to students. The method may involve a written explanation explaining the ability of brain to change and develop. It could be workshops or videos emphasizing the ability of brain to develop with use. Sarrasin et al. [55] found out that students' beliefs were influenced when taught about neuroplasticity and the potential of brain to grow with use, and resulted in positive effect on motivation and academic achievement. Also, Yeager and Dweck [69] reported that mindset interventions do use communication strategy such as, "the brain is like a muscle – it gets stronger (and smarter) when you exercise it" to encourage a growth mindset in students.

3.8 Research Evidence

The benefits of mindset interventions are self evidence and are measurable [69]. In accordance with Sarrasin et al. [55], targeting students' beliefs about the ability of their brain to grow and develop with use had a positive effect on motivation, brain activity and achievement. He asserted that the effect is more pronounced in mathematics achievement of at-risk youth. In Blackwell et al. [3] intervention study, seventh-

grade students demonstrated enhanced motivation in mathematics class after they have been taught about growth mindset. The report of the teacher affirmed that these students upheld their mathematics achievement over a 2-yers period contrary to the control group that demonstrated a decline in mathematics achievement.

In the report of Good et al. [24], low income seventh grade students who are mentored by college students and were admonished to see intelligence as malleable, achieved better in reading and math than students in the control condition. The study also reported a decrease in gender-gap for mathematics achievement. Also, females who were mentored about the malleability of intelligence earned higher scores in mathematics than females in the control condition [24].

The effectiveness and benefits of mindset interventions is not dependent on its duration. The evidence from Yeager et al. [72] showed that mindset interventions need not be long or be intensive to have benefits. In Yeager et al [72], an online growth mindset intervention with duration of less than one hour has been found to enhanced grades of low-achieving students and helped them stay on harder math class. Likewise, Burnette et al. [7] reported that grades, learning efficacy and students' motivation were indirectly affected by online growth mindset intervention that only lasted for a 45-minute. From all these researches, it is self evidence that mindset interventions are beneficial for learning.

3.9 Intervention Considerations

Mindset interventions are gainful and can be incorporated into school time table. It has potential for boosting students' learning and potential. So it is very important for school psychologist to support the use of mindset interventions [74]. For proper functioning of mindset intervention to optimize the benefits that will accrue from mindset interventions, it is expected that certain ingredients be present. In mindset interventions growth should be illustrated alone without making any reference to fixed mindset for effectiveness [73]. It is very important that intervention should be self-sufficient and heartening. The intervention should not be instructive and the intervention messages must be able to be incorporated into the learning environment [69]. The mindset theory which was initially referred to as implicit theories, has underlying beliefs that cannot be explicitly activated. Building mindset information into courses is an example of sneaky interventions [3], as well as mentorship experiences [24] and assignments [72]. The best practice in implementation of mindset interventions in school is for school psychologists to be careful about misinforming the students that their abilities can grow easily or remarkably. Such information could lead to doubt or frustration in students if the benefit takes time to manifest. Submission should not be made to the students about the scale of change or how easy to incur the change, but simple. So, it is important for growth mindset interventions to encourage partaker to reflect on theirs, and others, developmental prospective [69]. Lastly, in fostering growth mindset, the environment is vital and essential. The benefits of mindset interventions can only last when the school environment sustain the belief change. [72]. Yeager et al. [72] asserted that mindset interventions that hand out information about growth mindset without implanting it stealthy in the classroom and school environment may likely not be beneficial the students.

4. CONCLUSION

The role of teachers in addressing the problem of inequality in educational outcome cannot be underestimated; in teachers are the potentials for shaping the tradition of the learning environment. If a classroom is characterised by the belief that all students can improve on their abilities and take control of their academic outcomes, such a classroom is less psychologically hostile. If growth mindset beliefs are encouraged and strengthen by the environment, students benefit more from these beliefs. It is important to acknowledge that changing the classroom culture is demanding but achievable, but the problem is how to help teachers concretize and achieve such a transformation.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/117810