



Learning and Assessment of HOTS among Senior High School Economics Students

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Abstrak

Di dunia sekarang ini, di mana globalisasi meningkat pesat, pemikiran kritis, rasionalitas, dan toleransi sangat penting untuk kesejahteraan pribadi dan antarpribadi. Penelitian ini bertujuan untuk menganalisis pengaruh metode pembelajaran, konsep diri, dan penilaian terhadap kemampuan berpikir tingkat tinggi (HOTS) siswa pada mata pelajaran ekonomi di Sekolah Menengah Atas (SMA). Subyek penelitian melibatkan 220 siswa ekonomi dari tiga SHS. Penelitian ini menggunakan metode survei kuantitatif dengan menggunakan kuesioner yang dirancang dan menggunakan regresi logistik ordinal untuk mencari korelasi antar variabel. Temuan menunjukkan bahwa metode pengajaran, konsep diri, dan penilaian memiliki dampak yang signifikan terhadap pemahaman siswa tentang mata pelajaran ekonomi dengan mempromosikan keterampilan berpikir tingkat tinggi. Untuk meningkatkan sistem pendidikan Ghana dan memenuhi Tujuan Pembangunan Berkelanjutan (SDGs) 2030, penelitian ini juga menggarisbawahi perlunya penilaian berorientasi HOTS dalam pengajaran di kelas. Oleh karena itu, penelitian ini merekomendasikan penggunaan berbagai strategi pembelajaran, seperti pertanyaan terbuka dan tugas pemecahan masalah praktis yang mendorong siswa untuk memanipulasi situasi asing atau baru, daripada mengandalkan mengingat atau menyatakan kembali materi yang diajarkan sebelumnya. Implikasi dari penelitian ini adalah bahwa pengembang kurikulum harus mempertimbangkan pertanyaan terstruktur dengan baik dalam kurikulum yang akan memunculkan keterampilan berpikir tingkat tinggi siswa..

Kata Kunci: Kemampuan berpikir tingkat tinggi, Konsep diri, Metode Pengajaran Ekonomi, Pembelajaran, Penilaian.

Abstract

In today's world, where globalization is rapidly increasing, critical thinking, rationality, and tolerance are essential for personal and interpersonal well-being. The study aims to analyze the impact of teaching methods, self-concept, and assessment on students' higher-order thinking skills (HOTS) in economics in senior high school (SHS). The research subjects involved 220 economics students from three SHS. The study used a quantitative survey method with the use of a designed questionnaire and used ordinal logistic regression to find the correlations between variables. The findings suggest that teaching methods, self-concepts, and assessment have a significant impact on students' understanding of economics subjects by promoting higher-order thinking skills. To improve Ghana's educational system and meet the Sustainable Development Goals (SDGs) 2030, the study also underlines the necessity of HOTS-oriented assessment in classroom instruction. Therefore, the study recommends the use of various instructional strategies, such as open-ended questions and practical problem-solving tasks that encourage students to manipulate unfamiliar or novel situations, rather than relying on recall or restatement of previously taught material. The implication of this study is that curriculum developers should take into consideration a well-structured question in the curriculum that will elicit students' high-order thinking skills.

Keywords: High-order thinking skills, Self-concept, Methods of teaching economics, Learning, Assessment.

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1. INTRODUCTION

Currently, the educational system is based on concepts and skills that are related to academic and professional fields and to the methods that teachers employ to help their students learn (Hursen, 2021; Serin, 2020; Zerihun et al., 2012). This method seeks to link students' cognitive abilities with their classroom learning. High-order cognitive abilities have recently gained attention. In essence, the capacity for higher-order thought is a skill that prepares learners to get accustomed to solving issues in the actual world. Students are

expected to think critically at this level, but they are also expected to solve issues creatively (Gaimi, 2017; Taskin Yilmaz et al., 2018; Warsah et al., 2021). These higher-order thinking abilities can also help students advance in their careers, achieve more, gain social skills, exercise self-control, be imaginative, be responsible, put in a lot of effort, and be able to solve problems by choosing the best course of action (Afriyana et al., 2021; Saptono et al., 2020; Sugandi & Ruhimat, 2021). HOTS has become an educational challenge in the twenty-first century. Students must master higher-order thinking skills to increase education quality, particularly in the twenty-first century (Care, 2018; Kurniawan & Lestari, 2019). The generation of information through creativity and innovation will eventually become the foundation of the 21st-century enterprise. Every educational system needs to be prepared to adjust for a higher standard of instruction. Utilizing the HOTS technique is one of those strategies for academic success. Students must possess HOTS in the twenty-first century (Chalkiadaki, 2018; Saputri et al., 2019; Talmi et al., 2018). Efforts to improve higher-order thinking skills are not only focused on student activities but are also influenced by the strategies used by the teacher during the learning process (Hujjatusnaini et al., 2022; Nguyễn & Nguyễn, 2017). In today's world, where globalization is rapidly increasing, critical thinking, rationality, and tolerance are essential for personal and interpersonal well-being. This goal is to link students' cognitive capabilities to their learning process in the classroom, particularly by highlighting higher-order thinking abilities as an essential skill for students in the twenty-first century. The information provided by this study would serve as a foundation for understanding the importance of raising the standard of education in Ghana.

Higher-order thinking skills have been extensively explored and studied by many scholars, but they have also been misunderstood as stated in the works (Ennis, 1993; Karagöz & Çakir, 2011; Marzano, 1993). The difficulty of the questions posed or supplied to the students was often equated by academics and educators with higher-order thinking. Higher-order skills have many different facets; complexity is just one of them. Teachers employ a variety of techniques to enhance and foster students' higher-order thinking abilities. Creating assessment methods that can aid teachers in their work and expose students' competencies is necessary for developing students' high-order thinking skills. As industry 4.0 ushers in a new era of education, it is also important to understand the concept of creative thinking. Megatrends are worldwide transformative forces that have an impact on business, society, the economy, and other sectors of the economy (Kurniawan & Lestari, 2019; Malik & Janowska, 2018). As modern technologies like automation and artificial intelligence (AI) emerge, the nature of human work, as well as the skill sets and jobs that are required of it, change.

Ghana is a growing nation with a sizable population of 30.8 million people. The nation's future depends on the youth, who are supposed to receive the highest calibre of education. It's possible that advances in the twenty-first-century call for young people to be ready to participate in a market that is getting more competitive on a worldwide scale (Adu et al., 2020; Turiman et al., 2012). To implement the essential changes to guarantee students receive up-to-date and pertinent knowledge and skills, the educational system is now faced with brand-new challenges. Critical thinking and problem-solving abilities must be promoted in education in the twenty-first century. An aspect of the problem which could be derived from observation is that in Ghana, where jobs are increasingly tending to be more cognitive, that is the use of high-order thinking and interactive skills. Youth that lacks these skills could be penalized in the future labor market. Therefore, it is imperative to investigate the analysis of high-order thinking among students: A prospective study among senior high school economic students in Ghana. According to a review of extant literature, elements like students' self-perceptions, family environments, and learning environments all have a favorable impact on their higher-order thinking abilities (Afriyana et al., 2021; Saptono et al., 2020). However, studies on this important topic in Ghana are virtually non-existent. Besides,

neither Foster's study nor any other study has researched students' higher-order thinking skills (hots) in economics topics in Senior High Schools (SHSs) in Ghana. Ghana's last participation in the Trends in International Mathematics, and Science Study (TIMSS) program was in 2011. On the TIMSS scale, Ghana scored 194 points lower. Additional research revealed that Ghana's average scores in biology, physics, and earth science were all below 300, which indicated poor performance in those subjects. According to the TIMSS 2011 report, only Ghana had numerous eighth-grade participants with poor accomplishment rates of between 15 and 25 percent (Buabeng et al., 2014). Due to Ghana's poor performance, the majority of the pupils who took part in the 2011 TIMSS testing were rated as performing below the Low International criterion. This calls for urgency in assessing high-order thinking skills among senior school students in Ghana. The Ghanaian government has been working to raise educational standards, with a particular emphasis on fixing issues with how the curriculum is implemented. Based on the recommendations from the works of Andrew and Willingham, the government has been examining and creating a more flexible curriculum, participatory learning models, and relevant assessment ways to accomplish this goal. Notwithstanding the efforts of the curriculum creator and the government, how to develop students into high-order thinkers continues to be a crucial problem.

Although prior research has identified classroom preference, self-concept, assessment in learning, teaching methods, and peer interaction as important factors influencing student learning, very few studies have examined how these factors relate to Higher Order Thinking Skills (HOTS) from the viewpoint of the students. Only one indirect study conducted to look at the effects of learning style, online attitude, and motivation on students' HOTS (Huang et al., 2022). However, neither foster nor any other studies have explored the relationship between key learning factors such as the methods of teaching, self-concept, and assessment of learning on HOTS among senior high school students within the classroom context. To address this research gap, this study aims to analyze the impact of teaching methods, self-concept, and assessment on students' higher-order thinking skills (HOTS) among senior high school (SHS) economics students in Ghana and their implications for developing effective learning opportunities and assessment.

2. METHODS

This study employs a quantitative approach by using a questionnaire as the main instrument of data collection. Research design is the framework or method for investigation, utilized as a guide to obtain and analyze data (Abutabenjeh & Jaradat, 2018; Creswell, 2014). Utilizing quantitative method is addressing a research challenge that calls for identifying elements that affect a result. Due to its ability to investigate and comprehend the significance of specific persons or groups in investigating HOTS, qualitative research is utilized in this study. The objective is to forecast the value of the dependent variable using the values of the known independent variables and to describe how each independent variable affects the dependent variable. The population in this study was second-year students from three SHS in the Cape Coast Metropolis of Ghana. The selection was done based on the Ghana Education Service classification of schools into A, B, and C. In other to achieve the objective of this study a random selection was made from each of these classifications. Because the population's features are uniform, the sampling method employed in this study is proportional random sampling. The 29 items were classified into four predetermined factors by the SPSS version 26.0 software. The questionnaire was used to measure the impact of teaching methods, self-concept, and assessment on students' higher-order thinking skills (HOTS) in economics in senior high school (SHS) in Ghana. This study employed a multiple-choice test to gauge students' higher-order thinking abilities while studying economics. The topics of the

questions were international trade policies and the role of taxes in economic development. Usually, schools teach these fundamental skills. The reliability test was conducted using the Cronbach Alpha, and the validity of the questionnaire was evaluated using the Pearson test. To determine the direct effect between variables, The correlations between the variables were found using Ordinal Logistic Regression, which is done when we have a dependent variable with an ordinal measurement scale and an independent variable with a nominal/ continuous measurement scale (Guisan, 2000). The explanatory variables were calculated on an ordered, 5-point Likert scale for the responding participants. In this study, a log link was selected to show the model’s suitability. Data were processed and analyzed using SPSS version 26.0 software. The data collection procedure is presented in Figure 1.

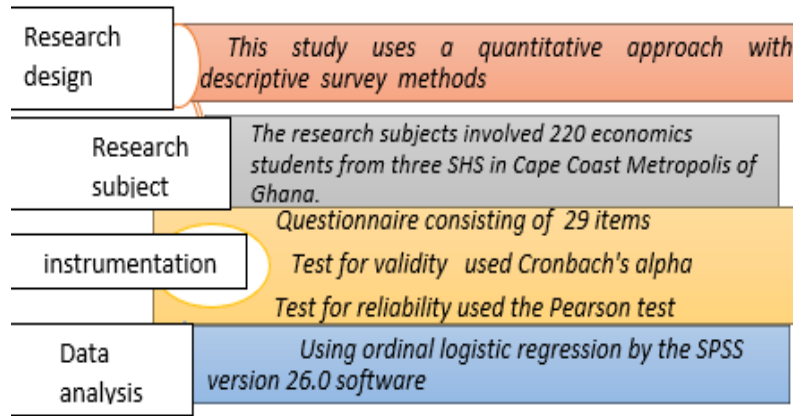


Figure 1. Data Collection Procedure

3. RESULTS AND DISCUSSION

Result

To estimate the impact on the dependent and the independent variables, the ordinary logistic regression analysis was used to achieve the stated objective of this study. The analysis of high-order thinking skills among economics learners, measured on a 5-point Likert scale, i.e., background characteristics, methods of teaching economics, self-concepts about economics, and assessment of learning economics. The ordinal logistic regression analysis is used to establish the correlations between independent variables in order to predict the dependent variable, just like other regression types like binomial, and multiple logistic regressions. When the ordinal logistic is employed, it helps to identify which of the independent variables have a significant impact on the dependent variable. Model fitting test is shown in Table 1.

Table 1. Model fitting test

Model	Log-likelihood	chi-square	Sig.
intercept only	218.518		
final	156.534	71.984	0.005

Table 1 displays the details relevant to the model. To assess whether the model increases the predictability of the outcome variable, we tested for the H1(null hypothesis). Table 1 shows a significant difference between the baseline model and the final model. Since the (P< .05), we reject the null hypothesis and conclude that all explanatory variables (final model) and each independent variable ("intercept only" model) are compared with the model. The statistically significant chi-square statistics are used to determine whether the

final model significantly improves the fit to the results when compared to the baseline (without an intercept). ($\chi^2 = 71.984, p < .05$) indicating that the final model offers a marked significant advancement under the results, say, under the intercept-only, the final model provides a marked change, indicating that the model makes stronger predictions than a mere guess based on marginal response categories. Hence the analysis is continued to test for goodness of fit as show in [Table 2](#).

Table 2. Goodness of Fit

	chi-square	Sig.
Pearson.	211.473	0.951
Deviance	155.148	1.000

Both Pearson's chi-square statistics and deviance-based chi-square statistics are included in the [Table 2](#). Results of non-significant tests show that the model and the data fit each other well ([McHugh, 2013](#)). The statistics are used to determine if the observed data and the fitted model match. Pearson chi-square test ($\chi^2 = 211.473, \rho = 0.951$) and the deviance test ($\chi^2 = 155.148, \rho = 1.000$) show a non-significant outcome. Hence the outcomes show that the model fits well. The result of pseudo R-square is show in [Table 3](#).

Table 3. Pseudo R-Square

Cox & Snell	0.513
Nagel-kerke	0.570
McFadden	0.313

[Table 3](#) measures the R-squared and shows how much of the variation in the dependent variable in the regression model is explained by the independent variable. The correlation square is therefore from 0 to 1, so this correlation will have a range of -1 to 1. No matter whether the correlation is positive or negative, the higher the R-squared, the higher the association between the expected outcome, and the actual outcomes ([Long, 2008](#)). The independent variable in [Table 3](#) regression model is explained here as having a function on the dependent variables. Pseudo-R values, such as Nagelkerke = 0.570, show that 57.0 percent of the explanatory variables describe a fairly proportion of methods of teaching economics, as well as self-concepts and assessments of how well students are learning economics. Multiple internal and external variables are only what is expected.

Table 4. The Impacts of MTE, SCE, and ALE on HOTS

Statistic	I	II	III
Coefficient	0.522	0.334	0.311
Standard error	0.581	0.496	0.436
95% CI	0.617 to 1.662	0.637 to -1.305	-0.551 to 1.172
Wald chi-square	0.808	0.455	0.499
Sig level	0.042	0.031	0.046

Note: column I represents MTE, Column II represents SCE, Column III represents ALE

The chart parameter estimates on [Table 4](#) are the center of the performance, explicitly telling us the association between our explanatory variables and the outcome variable. The coefficients for covariates and relative values of factor level coefficients provide useful insights into the predictor effect of the model. Positive correlations for predictor variables suggest the positive (differential) relationship between predictor and outcome. The Wald

statistic talks about the square of the factor ratio to its standard error. The row label coefficient contains the odds ratio representing the shift within the odds of being in a higher variable group with each one-point increase in the independent variables, while the corresponding independent variables remain unchanged. An odds ratio greater than 1 suggests an increased probability of being on the variable when values on the experimental variable rise at a higher stage, while a ratio less than 1 indicates a declining probability on the experimental variable with fewer values. An odd ratio equal to 1, indicates no expected shift within the probability of being high as values on P-values and coefficients function together in regression analysis to determine essential relationships within the model and the nature of those relationships. The $p\text{-value} > 0.05$ coefficients show that such relationships are statistically important.

Discussions

The test results show that methods of teaching economics (MTE), self-concepts (SCE), and assessment of learning economics have a significant impact on student's ability to think at a higher level. The significant positive value of ($\beta=0.522$, $p < 0.05$) for the methods of teaching economics (MTE) variable shows that the method of teaching has an impact on how students high order thinking. The coefficient of the methods of teaching variable is 0.522. This shows that the odd ratio of being at the higher level of high-order thinking skills rises by a factor of 0.522 for every one-point rise in the methods of teaching economics, holding the other independent variables constant. Therefore, the methods of teaching have an impact on students' high-order thinking skills. Our findings are consistent with previous study that claimed successful problem-solving in conventional academic contexts was significantly influenced by the cognitive and metacognitive elements of the teaching methodology (Mayer, 1998). The teacher is responsible for encouraging students' imagination and creativity. Students are to be made to be active participants in learning in the classroom. The teaching method used by the instructors will stimulate students' interest in critical thinking, helping them to acquire pertinent higher-order thinking abilities.

As previously mentioned, ordinal logistics makes the proportionate odds assumption that the relationship between the explanatory factors is the same in all possible comparisons involving the dependent variable (Burrige, 1981). If parallel line test results show non-significance, then the presumption is fulfilled. Statistical significance is taken as an indication of a failure to fulfill the statement. The notion behind ordinal logistic regression is that these explanatory variables' effects should be consistent or equal across a range of criteria. Consequently, this is sometimes referred to as the presumption of proportional odds (parallel lines) (Bayona-Saez et al., 2017; Williams, 2016). This means that whatever there is a threshold, the explanatory variables have the same effect on the odds. We interpret the findings from our study in Table 4 to mean that expectation is met (as $p=1.0$).

The significant positive value of self-concept ($\beta=0.334$, $p < 0.05$). This implies that the odd ratio of self-concept being at a higher level on high-order thinking skills increases by 0.334 for every one-point increase in self-concept about economics holding the other independent variables constant. The building block for a learner who develops a self-concept forms a good perception of themselves. For students to accomplish their intended learning outcomes, understanding and evaluating themselves is crucial capital (Effendi & Hendriyani, 2020; Fauziah et al., 2021). Self-concept is greatly impacted by how people, peers, and one's conduct perceive one. One's surroundings have a significant impact on how one learns and develop. As a result, the idea of one's self can be seen as a perception and viewpoint that one has of oneself and that affects how one interacts with people and their surroundings. The internalization and organizing of psychological experiences generate the concept of self as a social product. The result from this study corroborates with the findings who discovered a

connection between students' self-concepts and their critical thinking (Roberts & Dyer, 2005). This assertion is similar who asserted that students' perceptions of themselves directly influenced their computational thinking abilities, which include creativity, algorithmic thinking, cooperation, critical thinking, and problem-solving in a flipped classroom (Gong et al., 2020). Our result was in contrast who found that HOTS in the smart classroom setting was unaffected by students' concepts for learning (Huang et al., 2022). The statistically significant positive value of ($\beta=0.311$, $\rho < 0.05$). This shows that the odd ratio of being at a higher level of high-order thinking skills increases by 0.311 for every one-point increase in the assessment of learning economics, holding the other independent variables constant. Therefore, the assessment of learning has an impact on students' high-order thinking skills. Assessment of learning is a critical aspect of teaching economics, as it enables educators to evaluate students' understanding and progress. Multiple-choice examinations and other conventional methods of evaluation fall short in measuring students' HOTS.

Case studies, essays, and research projects, as well as other innovative and practical evaluation techniques, should be used by teachers instead. A collaborative effort between the teachers of all disciplines is required to increase students' higher-order thinking abilities; one teacher of a particular subject cannot do this on their own and can be taught at all academic levels. This research supports by previous study contention that abilities can be acquired cumulatively as students advance through their classes, subjects, and other experiences they receive from their institution (Abosalem, 2016). Additionally, evaluation processes should emphasize giving feedback that fosters development and improvement. Teachers should provide students with constructive criticism that identifies both their areas of strength and places for development. The implication of this study provide information related to curriculum developers should take into consideration a well-structured question in the curriculum that will elicit students' high-order thinking skills. These problems should call for students to manipulate previously learned material in brand-new or unique situations. We can also conclude that schools ought to encourage thinking skill instruction and learning while also providing students with an intrinsic desire to improve their self-concepts. By giving teachers the right rewards, this can be accomplished. Educational institutions must establish environments that value, encourage, and respect higher-order thinking abilities.

4. CONCLUSION

The objective of the study was to comprehend whether methods of teaching economics, self-concepts, and assessment have some impact on higher-order thinking skills (HOTS) among students with economics as a subject of study. Based on the outcome of this study; self-concept, methods of teaching, and assessment of learning have a significant positive impact on students' higher-order thinking skills when it comes to the study of economics subject. Also, from the estimation of ordinal logistic regression coefficients, we can conclude that methods of teaching have the highest influence but are followed by self-concept. The least amount of impact on HOTS came through the assessment of learning. Educators are urged to use varying teaching methods such as classroom activities and assessment tasks that leverage authenticity, real-world problem contexts, and open-ended problem types.

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