

## Evaluation of universal design for constructivist-based statistics learning module for students' increased motivation

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### ABSTRACT

This exploratory study was aimed at evaluating a module on the basis of the constructivist learning strategies to enhance the students' motivation in Statistics learning. The design and development followed the Universal Design of Learning principles. The design included flexible instructional materials, techniques, and strategies for differentiating instruction which benefited the students of English Education Department taking the Statistics course. The study used a survey covering of 33 students. The students' and teacher' responses to questionnaires revealed that the students' motivation and satisfaction increased toward the Statistics course in which Universal Design of Learning using various means of representation, action, and engagement was applied. It also suggested that the module was effective and that the Universal Design of Learning Model from the learners' viewpoint put more emphasis on instruction. Its content was suitable in designing and developing module on Statistics in the higher educational context in Indonesia. The study results are expected to reveal information on how to further improve the Statistics teaching and learning quality. The implications of the research are provided along with suggestions.

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## 1. INTRODUCTION

For an effective teaching to occur, a teacher should provide a variety of avenues to address all students' learning needs. One of their efforts is to implement a flexible approach to teaching, that is, Universal Design for Learning. The universal design (UD) term was introduced by Ronald Mace [1], an architect, who began to develop a more widely-accessed and useful designs than the ones of the conventional approach. The applications of the Universal Design for Learning (UDL) in the field of education are relatively new. This has set up a basis for the design of various educational products and settings, for instance, textbooks, computers, software, internet websites, and lab equipment for products, and classrooms, student union buildings and dormitories, libraries, and online learning courses for settings. It is intended to meet what the students with various personal backgrounds and needs require [2].

The Universal Design for Learning can be applied to Statistics learning. The design provides various means of (1) accessing information and knowledge for learners, (2) learners' expressions and activities in applying their knowledge, and (3) learners' engaging and challenging activities to stimulate their interests and motivation [2].

To be more specific, UDL has the three-fold principles. They are: (1) the network for recognition to deal with external stimuli influencing "what" students learn, (2) the network for strategies to facilitate "how" external information is processed based on students' schemata, and (3) the affective network to handle controlling students' attitudes and feelings in the engaging and stimulating activities.

As illustrated in the first principle, UDL serves to represent alternative supplies in a various ways: (1) to adjust how the information to appear, either visual or auditory information for perception, (2) to explain, understanding, and decode meanings of words, symbols, patterns, and mathematical symbolic expressions through various media, and (3) to activate background knowledge and experience so as to highlight the constellation of features, ideas, and relationships, to guide for information transfer and process, visualization, and manipulation to attain maximum comprehension [3].

The second principles suggests that UDL supports alternatives for: (1) providing responses, navigation, and access to tools and assistive technologies for physical action, (2) supplying leveled devices for communication, construction and composition, and fluencies as well as practice and performance, (3) leading to set goals, develop planning and strategy, facilitate and manage information and resources, and monitor phase by phase the implementation functions [3].

Additionally, UDL serves as a various means of stimulating activities, such as: (1) enhancing learners' autonomy, relevance, value, authenticity and focus, (2) attaining goals and objectives, providing various resources to optimize challenging collaborative community for continuous struggles and persistence to achieve mastery, and (3) boosting expectations and confidence that stimulate motivation, facilitating personal skills and strategy management and enhancing self-assessment and self-regulation [3].

Even though UDL gains its popularity among educators and disability support professionals, there has not much research carried out to assess its effectiveness as a model of good teaching. The present research illustrates efforts to implement the principles of UDL in a university course, i.e. Statistics. This course provides theoretical basics of statistical learning methods and their explanations in details on how to apply the multiple methods to students' academic life settings. The course serves as the introduction to the the study of the collection, analysis, interpretation, presentation, and organisation of data, and prepares the students basic competences to select, produce and explain the meaning of relevant descriptive as well as inferential statistics appropriately. Furthermore, the course helps students apply the various applications of statistics and its relevance to their lives and fields of study. The course does not require any background knowledge in Statistics. It is aimed for upper level undergraduate students and usable by non-experts, and accessible for them without requiring a background in Statistics.

Statistics has been included in the instructional curriculum of all levels of schooling. In any discipline, the ability to comprehend, interpret, and evaluate research as developed in a common Statistics course findings constitute an important basic skill [4] as quoted in [5]. Statistics is therefore inevitable in education as it equips the students the ability in collecting, analyzing, presenting, and interpreting data as well as in drawing conclusions in general. It is very useful in doing research work.

Prior to this research, in delivering this Statistics course, the faculty provides a textbook for the students since the typical university courses. There are two types of media dominating the courses. They are lectures and textbooks [3]. It was the only way of revealing information or transferring knowledge for all students. It did not prove to be optimal to address the students' various needs since the students have the differences in perceiving and comprehending the incoming information presented to them. In addition, the students were less motivated for studying and increasing their knowledge. If this problem had continued to occur, they would not have achieved the set learning objectives. When the students have positive attitudes to learning a foreign language and they succeed, the achievement is intensified. If the students with negative attitudes fail, it can divert them into a more negative position. If they obtain mostly positive experiences in language learning, they become confident in learning and absorbing the materials. A study by [6] revealed that the students' using of textbooks has brought its impacts on their achievements.

The students' success is determined by several contributing factors. One of them is the limited student engagement. It is also necessary to guarantee that the students' learning is provided with alternative supports, such as providing various alternatives in mentoring, modeling, scaffolding that can be released step by step as the student master competency and feedback that is important for learning and growth [3].

What had to be done for the students was to make sure that all of the students received accessible learning. It is not only classrooms or textbooks that are accessible for the students. Successful learning environments need three-fold attentions: facilitating information and informational supports, facilitating means of acting on information, and facilitating means of stimulating and engaging learning that are accessible to all of the students. The UDL principles are adherent to the three aspects of designing a learning environment.

To enhance the learning of Statistics, one of the ways is to apply the Constructivist-Based learning method. Constructivist-based learning methods can provide alternatives for students who cannot completely get along with the conventional lecture format to master the course material. For these types of students, the so-called more nontraditional learners require more varied modes of learning, particularly at the college level [7]. Moreover, Constructivist approach to learning enables student to implement theory to real world contexts and develop ideas from concepts and theories to reality, thereby promoting student learning [5]. Furthermore,

the constructivist learning model had a great impact in the acquisition of concepts and theories that are based on building knowledge and structural model of knowledge including the learners' conceptual schemes [8].

The present research therefore illustrates attempts to make the principles of UDL to occur in the Statistics course. The research examined how the development of a module with a semester-long, constructivist approach to learning in a basic statistics course was.

The term "universal design" is associated with the movement in architecture and product development to generate places or things that provide access for many people, including those with disabilities [9]. UDL, although has gained its popularity in architecture and other disciplines, is a relatively new phenomenon to higher education [3].

Universal Design for Learning (UDL) constitutes a framework guided by principles developed through research and principles to provide access for students to learn. UDL requires widely-accessed curricula and their components including instructional methods, materials, and assessments. By using UDL principles in the educational classroom in general, learning environments can be contextually adjusted and engaging for students. Additionally, the curriculum can readily be of instructionally workable and helpful. Students acquire knowledge, skills, motivation, and drive for learning. The assessment learning validity is assured [9].

According to [9], UDL has three basic principles. They are: (1) offering various and flexible methods of delivering materials to enable students with diverse learning styles to acquire information and knowledge, (2) offering various and flexible means of expression to demonstrate what they have learned, and (3) offering various and flexible means of learners' motivating and challenging engagement.

There are various meaning of constructivism. In the context of education, it includes philosophical, personal, social, radical, constructivist epistemologies, and educational constructivism [10-12]. The social and educational constructivism which covers theories of learning and pedagogy has brought into effects most considerably on curriculum design and instruction because they are seemingly the most conducive to integration into the current educational paradigms [13].

According to [14], it is noted that the majority of educators and cognitive psychologists have already implemented the principles of constructivism in the development of learning environments. They are: (1) setting up real-world environments in relevant contexts of learning, (2) focusing on solving real-world problems, (3) facilitating strategies for problem-solving, (4) providing multiple representations or views on the content, (5) adjusting instructional goals and objectives, (6) evaluating tools for a self-analysis, (7) providing tools and environments to enable learners to interpret the various lenses of the world, and (8) the learner's internally managing and mediating learning.

The study results of [13] suggested that constructivism in the field of education started to appear after the emergence of the behaviorist movement. It constitutes as an alternative view of learning that are learner-centered. This emphasis was on the individual's prior beliefs, knowledge, and skills during instruction. Prior knowledge has proved to significantly affect the ways individuals make meaning out of instruction. The constructivist focus on the social context has brought about an enormous change into a more collaborative over individual instruction. Finally, constructivism's greatest contribution to education is the change in focus from knowledge as a product to knowing as a process.

Motivation can be the most essential factor for educators to promote learning. Theories from various disciplines have overwhelmingly attempted to explain motivation. However, there is no perfect theory that satisfactorily explains human motivation thoroughly. It is the fact that human beings in general and students in particular are intricate creatures with complicated needs and desires. From the view of students, any learning can occur but students must consistently be motivated. The five key contributing factors of student motivation are: student, teacher, materials, method, and setting. The student must have equal access and share the same interest as well as educational values. They must be taught by a well-trained teacher. He or she must stay focused and monitor the teaching and learning activities, be committed and take a good care of his or her students and have ability to empower; whereas the materials must be accurate, well-timed, stimulating, and in relation to the student's current and future needs. The method to present the instructional materials must be stimulating, innovative, engaging, beneficial, and contextual providing hands-on real-world context devices. The learning environment which can easily be accessed, personalized, and conducive should empower the learning itself. The students' learning motivation reaches can be forged when students are exposed to numerous motivating learning experiences. That is, students ideally should have many sources of motivation in their learning experience in each class [8].

Student motivation is increased when these factors of students are pervasive. They include intrinsic and extrinsic motivation. Students have their own intrinsic and extrinsic learning motivation at various levels. Intrinsic motivational factors include the desire to be involved, to know and learn something, to engage in something, and to have social interaction. They may also include self-regulatory learning strategies, attitudes, intrinsic goal orientations, personality traits and age. Extrinsic motivation refers to behavior that is driven

by incoming factors. The extrinsic goal orientation generally has direct effects on the academic performance of the students in the university level. On one hand, the extrinsically-motivated individuals have tendency to develop their self-commitment to their learning achievement without the use of external rewards or reinforcement. On the other hand, such individuals have dependency only on rewards and results as expected for their motivation, e.g., tests and GPA [8]. Students who are motivated externally have the possibility of having low academic achievement than intrinsically motivated students. The so-called nontraditional students are interestingly reported to have higher intrinsic motivation than traditional students [15].

According [15], further stated that those academic motivations are influenced by a host of both individual and social factors. For instance, “the justification for choosing a major, the job opportunities after graduation, the previous academic records, and desire to complete an academic degree affect the intrinsic motivation.” The extrinsic motivation is significantly influenced by, for instance, “the chance of being hired for a job after graduation, income level, aspects related to subjects, aspects related to the teacher, aspects related to the methodology, aspects related to the class environment, the teaching materials validity, and the system of evaluation.” The type of extrinsic motivation mostly effective is the probability of being paid for a job. Since students’ parents have connection to their children, it is important to involve the parents in providing supports and motivation their children to perform better in college.

Next is hierarchy of needs. This refers to the student’s levels of intrinsic individual needs. At the basic level of needs, for instance, alignment of teaching methods with students’ needs and preferred learning. If a student in a physically, mentally or emotionally unsafe environment, he or she will get difficulty to thoroughly concentrate on learning. If the teacher is always criticizing the student, he or she will feel uncomfortable. This will consequently make him or her feel neglected. Consequently, the teacher must do what is required to support the student to considerably satisfy the need which facilitates the student’s focusing his or her attention on learning. For the students’ self-actualization, the teacher may also need to provide encouragement or opportunities. In other words, students with higher need for achievement have greater academic performance.

Another factor is perceived well-being or life satisfaction. The students’ perceived wellbeing or life satisfaction refers to the extent to which a student is happy and satisfied with his or her present state of affairs including feeling fun in doing activities, having meaningful life, balanced goals, self-actualization, healthy life, financial security, and social life. To promote a successful learning experience and performance, these well-being factors should be extended into the classroom. The contributing factors cover “student motivation, course level, grade expectations, type of academic field, and workload difficulty” [16]. The students who are more satisfied with their lives perform better and by achieving good results become happier. Dealing with these factors, the teacher needs to be patient and to support the student’s personal life conditions emerging in the process of education [17].

The next factor is efficient use of time, energy and focus. To manage time, the student needs to make sure that he or she is working on the highest priority tasks in his or her schedule. If he or she is focused and energetic, he or she will be working on the right things at the right time. The students should be taught how to achieve learning results while maintaining focus and energy. To maintain energy, the student should have the drive to get the task done while he or she is fully focused. In this case, the teacher should keep the students energetic and staying focused to become more productive.

Another is work-related focus. This factor helps students enhance their high competencies and skills to enhance their prolonged employability since learning and work become integrated into. By having focus on work-related learning, students take part in the job in activities which provide chances for learning, such as looking for new information and solutions for new problems, performing new tasks learnt on the job. It means that it is learning from doing work itself. By handling a particular job situation and particular tasks, it is also possible to learn operations and strategies and to acquire knowledge. This is motivating since students oriented towards self-direction, might learn more in the workplace [18].

Next, it is conscientiousness and achievement motivation. They relate to each other in the sense that conscientiousness has impacts on achievement motivation. Both are considered crucial to the student’s learning quality and possible success. Conscientiousness and achievement motivation have positive correlation with Grade Point Average (GPA). Conscientious students may academically perform better because they possess potentials of achievement motivation. Consequently, it is recommended to assess their previous academic which can determine the ways of maximizing the potential. To cope with less conscientious and achievement-oriented students, the teacher should provide proper caring and supports that positively impact these students. This enables the students to self-regulate motivation for challenging academic tasks. That will consequently promote their effort regulation capacities. Interventions could be developed for this purpose [19].

Another factor is public speaking competence. Student motivation has positive correlation with public speaking competence, but not to the demonstration of having knowledge on how to communicate with

other people [20]. If the student has better performance in public speaking, and delivered an organized speech, he or she will be more considerably motivated. The student may be feared and anxious to speak in front of people. Consequently, a lot of practice in public speaking will guide students how to overcome the public speaking anxiety. Meanwhile, he or she will therefore be overcoming other psychological barriers, rebuilding traits, and enhancing self-concept. These positive results should make the student be more courageous, confident and motivated. The student may hold practical benefits beyond delivering a project presentation or leading a successful meeting [21].

Lecture attendance is the next prerequisite to learning success. The lecture attendance is attributable to students' learning or academic success. Attending lecture every day increases a student's chances of success in academic and personal or social life. The lecture attendance facilitates learning in a variety of ways. It is also considered to be a valuable and sourceful learning experience for students. Students generally see lectures as optional and not always as a beneficial or enjoyable part of their journey in college. However, there are possible reasons for the missing of the students during the lectures and practical hours. The reasons include employment, the health factors, the additional sport activities, not proper schedule, the teaching methods used by the teacher, the teacher himself, the subject and its importance, the lack of motivation etc. [22].

Another is thorough and continuous educational plan. Educational plan is "a formalized plan and a process that involves student planning, monitoring, and managing their own learning and career development". The development of a long-term educational plan is inevitably important for students to value education and to engage most in school. This plan is also flexible to allow students to change their plans as their personal and career interests and goals. Each student's learning, progress and achievement in the education profile is personalized. This planning process can empower students to see the connection between school and work. At the end, it prepares them for a lifetime of productive employment and continual learning [23].

In relation to Statistics course, the Statistics course is designed for students majoring in numerous fields of study since statistics is being widely used in a variety of disciplines. Topics include presenting and describing data, the normal curve, regression, probability, statistical inference, confidence intervals, and to hypothesis tests with applications in the real-world work environment, in particular in fields such as business, science, finance, and economics. It is therefore very important for reading statistics, using statistical methods, and interpreting complex data sets. This Statistics course will provide the students with the theoretical basics of statistical methods such as sampling and collecting data, probability, distributions, regression analysis. At the end of this course they will demonstrate and apply statistical methods in accordance with their respective research project.

The Statistic course learning requires the students to construct their own knowledge, facilitated by their instructors, and learn how to pass through mental processes for solutions to statistical problems. The course meets the structural needs for students to engage in academic coursework any time and place while also developing their analytical and communication skills. It provides students with the basic concepts of data analysis and statistical calculation. Topics covered include basic descriptive and association measures, probability theory, confidence intervals, and hypothesis testing.

Research results on the teaching of college-level statistics courses by Garfield [24] and [25] showed that the college students were being exposed to statistics in a wide variety of contexts. Most students perceived statistics to be unengaging, discouraging, and uninteresting. It was taught by the teaching staff from a wide range of disciplines with various levels of knowledge in the subject. They determined what students had to learn, to adjust their teaching to the research literature recommendation, and to use assessment to determine if their teaching was effective and if students were developing statistical understanding and competence.

The Statistics learning will be carried out, if the students are actively engaged in the instructional process, construct and connect past knowledge to new knowledge and can demonstrate what they have learned in a real-world context. To facilitate the student learning, the instructors should be able to assess students' existing knowledge and competencies as they relate to the concepts in a form of class discussion. In addition, the instructors should be able to give fast and constructive feedback during instruction to help clarify student understanding of the material content as well as provide students with chances for interaction [25].

To motivate students through engagement and interest, a module based on the constructivist learning strategies was developed. Universal Design for Learning could provide such an opportunity and it had recently gained popularity in higher education. [26] suggests that even in a relatively small class at a graduate level, the use of UDL approach facilitated students' collaboration and engagement; was considered appropriate by the students; and promoted effective teaching and learning.

## 2. RESEARCH METHOD

The present study used exploratory research method since it was an examination into a subject, i.e. the use of Universal Design for Learning (UDL) model in an attempt to gain further insight. This quantitative research was based on survey covering a sample of 33 students. The survey procedures protected the students' privacy by keeping it anonymous and voluntary participation. Before the survey administration, the local parental permission procedures were followed. The students then completed the self-administered and close-ended questionnaire adapted from a model by [27] during one class period and recorded their responses directly on an answer sheet. The responses were recorded on five point Likert scales anchored by Strongly Disagree (1) to Strongly Agree (5). The questionnaire was designed to deal with the dependent variable like motivation (Y), and independent variables, learning materials, its organization and resources (X1), students' satisfaction (X2), teachers' skills (X3) and effectiveness, efficiency, and acceptability of the module (X4). Data was examined with the help of statistical tool SPSS (Statistical Package for the Social Sciences) to draw meaningful research conclusions which constitute descriptive, correlation and regression analyses.

## 3. RESULTS AND ANALYSIS

After gathering sample data from strength of 33 students by filling the questionnaire, the results were relevant to the facts as shown in the following section.

### 3.1. Descriptive analysis

Descriptive statistics is needed to assess the validity of the sample to be representative of the targeted population. A descriptive analysis was employed to reveal to what extent association/correlation lies in between the variables for the interpretation of data to indicate the Mean and Standard Deviation. The results were obtained as following in the Table 1.

		Statistics				
		Y	X1	X2	X3	X4
N	Valid	33	33	33	33	33
	Missing	0	0	0	0	0
Mean		5.33	4.58	4.94	4.88	5.18
Std. Deviation		1.164	.902	1.171	1.193	.917
Minimum		3	3	3	3	4
Maximum		7	7	8	8	7

From the respondent opinion, the value of independent variable effectiveness, efficiency, and acceptability of the module was highest with a mean of (5.18), student satisfaction was second highest with a mean of 4.94, the teacher's skills was third highest with a mean of (4.88), and the rating of learning materials, its organization and resources was 4.58. The rating on dependent variable student motivation was highest with a mean of 5.33. The standard deviation of respondents' opinion on learning materials, its organization and resources on was the least .902, as compared to the other dimensions. This indicates that there is highest quality in the learning material dimension.

The standard deviation of the students' opinion on teacher's skills was the highest (1.193) in comparison to the other dimension. This indicates that the teacher's skills were not much involved or linked to the students' motivation.

### 3.2. Correlation analysis

To show the inter relationship between variables or to measure the strength or degree of linear association between two variables, a correlation analysis was done.

Table 2 estimates the strength of the linear relationship between variables. The core values show that there is a positive correlation of student motivation with learning materials, its organization and resources, students' satisfaction, teachers' skills and effectiveness, efficiency, and acceptability of the module in Universal Design for Statistic Learning. The dependent variable "student motivation" has the strongest correlation with effectiveness, efficiency, and acceptability of the module (.820\*\*) with materials, its organization and resources (.734\*\*) with student satisfaction (.726\*\*) and there is also correlation of teacher skills (.683\*\*) with the dependent variable student motivation.

Table 2. Correlation analysis

		X1	X2	X3	X4	Y
X1	Pearson Correlation	1	.744**	.706**	.625**	.734**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	33	33	33	33	33
X2	Pearson Correlation	.744**	1	.733**	.738**	.726**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	33	33	33	33	33
X3	Pearson Correlation	.706**	.733**	1	.649**	.683**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	33	33	33	33	33
X4	Pearson Correlation	.625**	.738**	.649**	1	.820**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	33	33	33	33	33
Y	Pearson Correlation	.734**	.726**	.683**	.820**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	33	33	33	33	33

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### 3.3. Regression analysis

To display by using the statistical tool used to investigate the closeness of the relationship between two or more variables determined by R square, f-test and t-test, the results are shown as following in the Table 3.

Table 3. Regression Analysis

Variables Entered/Removed <sup>a</sup>			
Model	Variables Entered	Variables Removed	Method
1	X4, X1, X3, X2 <sup>b</sup>	.	Enter

a. Dependent Variable: Y

b. All requested variables entered.

Model	R	R Square	Adjusted R Square	Model Summary		Change Statistics			
				Std. Error of the Estimate	R Square Change	F Change	df1	df2	
1	.870a	.757	.722	.613	.757	21.823	4	28	

Model Summary	
Model	Change Statistics
	Sig. F Change
1	.000a

a. Predictors: (Constant), X4, X1, X3, X2

### 3.4. Analysis of variance

The sum of square shows the total variability around the mean. The degree of freedom means the number of sample 1. The F test value (21.823) shows the combination of all variables, over all significances of the model, it means that independent variables, for instance, learning materials, its organization and resources, students' satisfaction, teachers' skills and effectiveness, efficiency, and acceptability of the module on dependent variable student motivation met, as shown in the Table 4.

Table 4. Analysis of variance

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.809	4	8.202	21.823	.000 <sup>b</sup>
	Residual	10.524	28	.376		
	Total	43.333	32			

a. Dependent Variable: Y

b. Predictors: (Constant), X4, X1, X3, X2

### 3.5. Coefficient analysis

To show how strongly the two variables were related to each other or the degree of association between the two, the correlation coefficient was calculated. The beta coefficient indicates how strongly the independent variable associated with the dependent variable. The standard error reflects how much sampling

fluctuation a statistic will show. The standard error of a statistic depends on the sample size. The standard error of constant (.670) value shows the 67% of fluctuation of sampling of knowing, and the standard error of independent variable learning materials, its organization and resources is (.193) value shows the 19.3% of fluctuation of sampling mean, student satisfaction (.171) value illustrate the 17.1% of variation of sampling mean, teacher skills (.145) value illustrate the 14.5% of variation of sampling mean, and effectiveness, efficiency, and acceptability of the module (.181) value illustrate the 18% of variation of sampling mean, as shown in Table 5.

Table 5. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.656	.670		-.980	.336
1	X1	.397	.193	.308	.049
	X2	.024	.171	.024	.888
	X3	.088	.145	.090	.552
	X4	.699	.181	.551	.001

a. Dependent Variable: Y

Standardized coefficients are the coefficients of the estimated regression model and would be obtained if the predictor and the outcomes variables were standardized prior the analysis and the comparing the size of the coefficient across variable. The T value of independent variable learning materials, its organization and resources is (2.601). Student satisfaction represent its T value is (.142), teacher skills represent its T value (.602), and effectiveness, efficiency, and acceptability of the module represent its T value is (3.863). Hence, the results of T value of learning materials, its organization and resources, and effectiveness, efficiency, and acceptability of the module variables show the significance of their occurrence in the test.

The result shows that learning materials, its organization and resources, students' satisfaction, teachers' skills and effectiveness, efficiency, and acceptability of the module affected student motivation. The probable explanation is that the learning materials would provide the students with its structure of presentation and learning resources along with its users' satisfaction and teachers' effective performances skills and effectiveness, efficiency, and acceptability of the module that enhanced their motivation. The module would be in a position to give them attention, encouragement, stimulation and support with its acceptability. This could have a motivating effect on the students. It would eventually encourage the students to do well and have high academic performance.

These findings support the study by [28]. They revealed that the application of a module using Massive Open Online Course (MOOC) in the teaching and learning process in an architecture classroom functioned as a pedagogical tool that appeared to be a possible solution in heightening the eagerness of learning. The findings are also in line with the report of [29]. They revealed that a web-based module that dealt with metacognitive learning strategies to learners within academic disciplines in higher education employing a systematic Instructional Systems Design (ISD) process: ADDIE (Analysis, Design, Development, Implementation, and Evaluation) led to more effective methods and improved learner outcomes.

#### 4. CONCLUSION

To conclude, the purpose of the research was to evaluate a constructivist-based Statistics learning module. It was intended to gather evidence to inform academic judgements about all aspects of the design, delivery and assessment of the module. The module was developed in cooperation with Universal Design for Learning (UDL) Statistics learning module. Finally, the UDL framework facilitates a flexible, responsive curriculum that minimizes learning barriers. Utilizing a UDL approach, educators provides a wide range of ways of curriculum options that present information and content, manner in which learners can express what they know, and engage students in meaningful, authentic learning. The bottom line is that UDL helps educators meet the needs of all students [26]. It encourages flexibility of structure, closeness to a real life situation and autonomy. It is developed for self-motivated learners.

This module could also be an interesting model for use with different topics and content. However, the subjects of this research might not have been considered as wide representative of a group of students, and that its persistence is compromised by low response rates. For future research, it is recommended that every effort made could guarantee that evaluations are completed by a large number of students to make



conclusions can be drawn. In addition, a related future research is needed to investigate the relationship between the quality of the module and the students' assessment results.

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