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Teaching and Learning Calculus with Maple Software

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Abstract

Modern software is playing an important role in teaching calculus to the students. Maple software is one of them. Maple software is a system that will be useful for mathematicians, teachers, engineers, researchers and scientists, who are faced with the design calculations, logical

modeling. Maple contains all the necessary tools to get started, context menus, a variety of templates and user-friendly tools for computing, the ability to edit ready equation. The numerical calculation is closely linked to the history of computers, computers that have been designed to facilitate the implementation of complex calculations. It is involved in many scientific and industrial fields, to simulate study and anticipate all sorts of phenomena. For years, the numerical calculation was carried out mainly with the Maple software. Today there are many tools, more or less specialized, including the so-called software formal or numerical calculations. They have grown substantially in recent years, regularly providing new features to meet the diverse needs of engineers, particularly in terms of simulation and prototyping.

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Introduction

Calculation is based on clear rules of the formal apparatus operating with the knowledge of a certain type, which allows to give a precise description of a certain class of problems, and for certain class and algorithm solutions. In mathematical logic, the concept of AI has undergone refinement and more rigorous formalization. Some of these formulas are selected as axioms, from which by converting the right to receive the new formula, called theorems. Once added to the IV interpretation, which gives the value of its original symbols and formulas IV turns into a language that describes a certain subject area (Awang, & Zakaria, 2013). For teaching and learning calculus, Maple software is doing a great job. Maple can be used to conduct numerical and symbolic computation, allows to model multi-technology systems and provides tools for the preparation of technical documentation. Maple provides a set of new tools that simplify the preparation of visually appealing and easily interpretable three-dimensional drawings. Computing Platform Maple provides a solution to a wide range of engineering, mathematical and scientific problems.

At present the main direction of education is to ensure the quality of education. Humanity in its activity constantly creates and uses models of the world. Visual models are often used in training (Zakaria, & Salleh, 2015). The use of the computer as a new dynamic, developing teaching aids are the main distinguishing feature of the computer planning. Using a computer and the software allows students to vary the nature of learning and deepen learning process that has a beneficial effect on the effectiveness of training. Interconnected studying maple software,

and calculus allows students to familiarize with the elements of the physical processes and use your computer as a desktop research tool. Such an approach to the study contributes to the development of creative activity of students, to carry out a combination of individual approach to the various forms of collective learning activities. More rationally it can be demonstrated in the study of various computer packages. Maple is the first universal mathematical package, which offers full support for MathML 2.0 standard, which controls both the appearance and meaning of Internet Mathematics (Botana, Abánades, & Escribano, 2014). This exclusive feature makes the current version of MathML primary means of Internet Mathematics and establishes a new level of compatibility of multi-user environment. TCP / IP protocol provides dynamic access to information from other Web sites, such as the data for financial analysis in real time and according to the weather (Chin, et.al, 2012).

The use of Maple software lessons allows student to solve complex problems, making big calculus transformations, while avoiding mistakes. Maple software lets students to create their own library of routines in their design; the student develops the ability to programming. In this connection, the selected topic is relevant. The aim of the paper is to identify factors in the development of programming skills in high school students using the Maple package for teaching informatics at the profile level.

Hypothesis

Is Maple software helpful in teaching and learning calculus to students?

Research questions

❖ Is there significant relationship between the Maple software and calculus learning and teacher?

❖ Are boys more dependent on learning calculus with the help of Maple software than girls?

❖ There is no dependence of both boys and girls on learning calculus with the help of Maple software.

Literature Review

Maple can be used to conduct numerical and symbolic computation, allows to model multi-technology systems and provides tools for the preparation of technical documentation. Maple provides a set of new tools that simplify the preparation of visually appealing and easily interpretable three-dimensional drawings. According to Demana, (2000), Maple is a computer algebra system, that is to say, he can manipulate algebraic expressions such as (a + b) * (c + d), and perform demonstrations. It is used for teaching mathematics by Herb Brown in the United States. It belongs with LaTeX (for word processing) and some other software, the range of scientific tools found in most laboratories and a few businesses (Tuluk, 2014). Maple Platform provides a solution to a wide range of engineering, mathematical and scientific problems. Maple is the vital specialized processing programming throughout today's architects, mathematicians and researchers.

Hohenwarter, Hohenwarter, Kreis, and Lavicza, (2008) portrays that Maple programming offers understudies some assistance with needing to make a speedy estimation, plan sheets, show major ideas, or produce refined excellent recreation models. Maple calculation offers the expansiveness and profundity to handle each sort of science. The consequence of over 25 years of cutting edge innovative work, Maple consolidates the most capable motor of numerical figuring world with the natural "client intuitive" interface. Its brilliant report environment

consequently catches the greater part of understudy's specialized learning in an electronic structure that flawlessly incorporates estimations, informative content and math, illustrations, pictures, sound and design. Estimations of fundamental articles are scientific expressions; spoke to as coordinated non-cyclic charts (Hohenwarter, and Fuchs, 2004, May). Maple gives a particular programming dialect, motivated by Algol, which are both the intelligent use dialect and one in which is composed most of the math library programming.

Calculus originated in the seventeenth century as the system cuts the results obtained by the method of exhaustion, and as a method of opening such results (Lagrange, 1999). The types of tasks for which the calculation has appeared appropriate, the determination of lengths, areas and volumes of shapes and curves define local properties, such as tangents, normal and curvature - in short, what we now recognize the challenges of integration and differentiation.

In addition, the calculation is ultimately related to the theory of infinite series, generative design, which became fundamental in number theory, combinatorics and probability theory. In the first case, an unusual success calculation was possible because it replaced the long and thin arguments exhaustion brief routine calculations (Kilicman, Hassan, & Husain, 2010). As the name suggests, the calculation consists of rules for the calculation of results, and not their rationale. The mathematicians of the seventeenth century were familiar with the method of exhaustion, and assumed that they could always go back to it, if the results called into question, but the flow of new results has become so great that it is rarely possible to make the time.

Maple software can be used to conduct numerical and symbolic computation, allows to model multi-technology systems and provides tools for the preparation of technical documentation (Tall, 1996). It offers the depth, scope, accuracy and performance computation to

solve any mathematical and engineering problems, regardless of whether the required basic design calculations and algorithms or develop complex models, logic simulation and learning mathematics. The intuitive interface of Maple software captures all the technical data of the user comprises a plurality of analysis tools, equations editing function, context menus, and palettes for quick start. Maple product is an indispensable system of computer algebra for engineers, mathematicians, and scientists (Tall, 1993).

According to Ochkov, & Bogomolova, (2015), Maple software is distinguished by a rich mathematical library (about 2,000 procedures), which are composed of specialized packages corresponding to a number of mathematical sections; well-structured; concise and user-friendly interface; extensive information visualization and its output in various formats. The standard library can be augmented their own user programs written in Marple-language that allows students to expand the possibilities of this or that section of Maple to solve non-standard problems (Abdulwahed, Jaworski, & Crawford, 2012). These properties make the system useful tool to accompany the math courses. Maple is used as a tool of support courses in calculus. On the solution of linear-algebraic problems linage oriented package in the standard library. A set of procedures it covers quite a range of issues addressed in the elementary course, but it is not designed to support more or less advanced course in linear algebra. Thus, there is a need to expand the capabilities of the system partition for linear algebra, beyond the standard curriculum, implemented by means of Maple algorithms for solving typical problems that arise when studying these sections.

According to Tsarava, Halkidis, Venardos, & Stephanides, (2013), Maple software is a means of increasing the efficiency of teaching. It was in his capacity as the computer and information science are considered as a component of the educational system that is not only

able to make radical changes in the very understanding of the category of "means" in relation to the process of education, but also a significant impact on all the other components of a local educational system: target , content, methods and organizational forms of training, education and development of students in educational institutions of any level and profile. The computer is a means of increasing the effectiveness of research activities in education. Modern scientific research, especially interdisciplinary research, complex, already cannot be successful without the full information provision. This software requires a search for the sources most relevant information corresponding to the current level of educational content, selection and selective evaluation of this information, its storage, providing the proper level of classification of information and freedom of access to it on the part of potential consumers finally prompt the requisite information to the user according to needs (Wiest, 2001). Maple is an integrated computer system with advanced capabilities in the field of mathematics. It includes software for interactive algebra, mathematical analysis, discrete mathematics, graphics, numerical calculations, and many other areas of mathematics. It is also a unique software environment, accelerating the development of mathematical programming thanks to its large library of built-in functions and operations.

Cao, (2015) states that Maple system can be used at the most elementary level of its capabilities - as a very powerful calculator. The main advantage of Maple system is its ability to perform arithmetic operations. When working with fractions and roots they are in the process of calculation to decimal mind that allows you to avoid errors when rounding. If you want to work with decimal equivalents in Maple system has a team of approximating the value of the expression in the numbers floating point format. Maple system calculates the finite and infinite sums and products, performing computing operations with complex numbers, easily lead to a

number of complex number in polar coordinates, the numerical values of elementary functions, as well as many special functions and constants. Computer is a complex technical device. Its educational and teaching opportunities in many respects predetermined by technical factors, those real achievements in science and technology, which give the computer certain properties and allow it to carry out a proper effect of the given functions, including function-oriented education system needs. In recent years, computers and based on these information technologies have changed significantly. Suffice dynamic and significant changes in the cell-based computers have led not only to their wider use in the educational process, but also to improve the reliability, accuracy and speed of their work, increase their functions by actually computing to more complex, logical, heuristic, and certain extent creative.

Maple system offers different ways of presenting and transformation of expressions, for example, operations such as simplification and factoring algebraic expressions and bringing them to a different kind. Maple system can be used to solve systems of equations and algebraic equations (Larson, & Edwards, 2013). Maple also has many powerful tools to evaluate expressions with one or several variables. Maple system can be used for solving differential and integral calculus, calculating limits, expansions in series, summation of series, multiplication, integral transforms, continuous or piecewise continuous functions. The concept of the calculus is the central concept of algorithms and, accordingly, the main component of the algorithmic culture (Prince, & Flek, 2014). There is no need (and opportunity) to use rigorous mathematical refinement of this concept, it is sufficient to interpretation intuitive visual level. It is an essential in presenting acquire such content properties of algorithms, as we know, mass, and deterministic performance (Prince, & Flek, 2014)

Maple introduction of the system of education is carried out in the form of conducting the elective course "Study of Maple symbolic mathematics package", whose main task is to create the necessary conditions for the implementation of the experimental program. The main objective of the experimental work in Maple learning process - it is self-actualization of students in the implementation of the learning process in computer science and information technologies of new organizational forms of the use of computers based on modern symbolic mathematics packages.

Education in the framework of this experiment can achieve goals such purposes as self-realization of students and receive their professional competence, the development of mathematical thinking and scientific creativity of students, improve the quality and efficiency of the educational process, increase students' interest in learning activities and interest in its end result, professional orientation of students, professional development of teaching staff, mastering the methods of information technologies, and the creation of computer means to enhance the learning process (Lopez, 2012). In the process of studying the Maple symbolic mathematics package, students work out practical skills in solving mathematical problems using a computer. Maple is their helper in learning. Students learn to work for self-control: solve problems of traditional methods and test results with the help of Maple (Prince, & Flek, 2014).

Maple Multi-pack is one of the most powerful mathematical packages. Its capabilities cover a lot of areas of mathematics and can usefully be applied at different levels, ranging from high school students training to the level of serious scientific research (Jungić, & Mulholland, 2014). Maple is an analytical calculation system for mathematical modeling. The information presented in the thesis work technique of studying some of the algebra and analysis with the help of the Maple allowed to significantly increase the efficiency of the learning process. By

visualizing the material complex mathematical formulas and conversion becomes much easier, and the process of assimilation of the material high school students is held much more efficient. Computer mathematical packages play a very important role in the reform of teaching mathematics in secondary and higher schools (Mosina, 2015, March).

Information support of the educational process is designed to release the student from routine work, to allow him to focus on the essence of the studied material at the moment, consider more examples and solve more tasks to facilitate the understanding of the material by other methods of presentation (Sevimli, 2016). The possibility of computerization of the educational process occurs when a man performed the functions can be adequately formalized and reproduced by technical means. Therefore, before proceeding to the design of the learning process, the teacher must determine the relationship between the parts, which can be automated and which cannot (Sozcu, Ziatdinov, & Ipek, 2013).

Calculus provides a clear and simplified presentation of own notions Calculus, focusing on exercises and solving practical and realistic problems that highlight the close links between calculus and applications used in everyday life. By using intuition, a rigorous approach to thinking and proven solving techniques, Calculus offers readers a learning environment enabling them to understand and critique their own performance.

Maple objects (with some exceptions) represented with maximum sharing, that is to say that two identical objects are represented by the same object in memory. In particular, expression trees are stored as directed acyclic graphs. Specifically, all objects (almost) built during a Maple session are stored in a hash table overall (Yang, 2014). This applies not only to the named objects, but also to expressions and sub-expressions involved in the calculation. Each newly

created sub-item is compared to the elements already present in the table. If the object is new, it is stored and added to the table. If instead the same object has already been used, the old object is immediately used instead. This ensures the existence of a single copy of each expression in memory.

Maple procedures work on expressions represented by such trees and the basic steps are to analyze these trees to determine their components, to extract these components and to use them to build new trees. Trees that are under the root are the operands of the expression and can be isolated by the procedure "op", their number being returned by the command "nops". The order of the operands of a commutative operator can change from one session to another. The procedure "HAS" determines whether an expression appears under-expression of another. It allows for example to determine an expression is independent of a given variable.

Among the basic procedures that are building new objects from existing expressions include "eval" , "subs" , "convert" , "select and remove" . In particular, the natural way to calculate the value of a function for a given value of its variables is to evaluate the expression that represents the function using "eval" . A procedural level lower than "eval" is "subs" , which performs a simple substitution. The software applies the automatic simplification rules, but does not evaluate the result of the substitution.

These procedures do not change their argument - most of Maple objects cannot be changed - but creates altered copies. With maximum sharing this copy does not cause excessive memory consumption. The software allows both to work on numerical quantities (integer , real , complex) than with polynomials , functions, or series . Maple produces derivations , of integrations , resolutions of linear systems of equations , the matrix inversions , asymptotic

expansions or resolutions of differential equations as symbolic , that is to say, keeping unknowns in resolution. The Maple system also offers much functionality in number theory and combinatorics (Samková, 2012).

In the "Principia," Newton mathematically displays all the major known facts at the time the mechanics of terrestrial and heavenly bodies, the laws of motion of a point and rigid body, Kepler's laws of planetary motion. Many mathematical writings of Newton and were not published in a timely manner. His first relatively detailed publications relate to the 1704 work This "listing the third-order curves", which describes the characteristics of these curves, and "Discourse on squaring the circle", dedicated to the differential and integral calculus.

In 1688 Newton choose the parliament, and in 1699 he moved to London, where he received a lifetime position of director of the mint. The works of Isaac Newton for a long time identified the development of physics and mathematics. A large part of classical mechanics for a long time remained in the form created by Newton. The law of gravity is gradually felt to be a single principle, which allows to build a complete theory of motion of celestial bodies. They created a mathematical analysis has opened a new era in mathematics.

Maple is an interpreted system. In its most common usage, the user enters a command line written in a language specific, and the system returns a result. For example, the following command calculates the solution of the differential equation of the second order y '' - 3y = xsatisfying the initial conditions y (0) = 1and y '(0) = 2 : dsolve ({diff (y (x), x, x) -3 * y (x) = x, y (0) = 1, D (y) (0) = 2} y (x)); It is also possible to write in the same language, programs that

are not compiled but interpreted their call, and enrich the system with new orders. Beyond the features of computer algebra and programming itself, Maple allows for example to copy and paste into a word processing mathematical formulas derived from calculations, draw curves and surfaces, or generate digital programs C programming language provides a console mode and a graphics mode. It is available on most operating systems (GNU / Linux, Macintosh, Windows).

The Maple Package including routines for solving linear and tensor algebra, Euclidean and analytic geometry, number theory, probability theory and mathematical statistics, combinatorics, group theory, integral transformations, numerical approximation and linear optimization (simplex method) as well as the problems of financial mathematics and many, many other tasks.

Financial calculations in Maple

For the financial settlement is a software package finance. C It can help you calculate the current and the accumulated amount of the annual rent, the total annual rent, the amount of life annuity, aggregate annuity and interest on unregistered bonds. Furthermore, this package will also help in calculating the income received until maturity of the bonds. You can build the amortization table to determine the actual amount bid for compound interest and calculate the current and future fixed rate for a specific number of compound interest.

Programming

Maple system uses only a procedural language 4th generation (4GL). This language is specially designed for rapid development of mathematical routines, and custom applications. The syntax of the language syntax is similar to the C language, FORTRAN, BASIC and Pascal.

Maple can generate code that is compatible with programming languages such as FORTRAN and C, and with the language set LaTeX text. One advantage of this feature is the ability to provide access to specialized numerical solver, maximum acceleration solutions to complex problems. For example, using the Maple system can develop a specific mathematical model and then using the same Maple system model to generate the corresponding C code.

Methodology

Sample

For measuring teaching and learning calculus with maple software, 25 students are selected from the field of mathematics and calculus. The ages of the sample is varies from 23 to 30 years. The sample is selected from both males and females.

Research Method

For this survey, quantitative research method is used. The questionnaire is designed to know the hypothesis of this research. The questionnaire is tested with the help of SPSS software. After analysis the reliability of the scale, the questionnaire is distributed among the students. The students are asked to fill the questionnaire honestly. After that, the step of collection of questionnaire is conducted. The aim is to better understand the challenges faced by students with these calculations and study how the use of software like Maple can help them overcome these difficulties, by promoting interactions and graphical representation Summary of the objects.

Building on the instrumental approach to the integration of computer tools in education, we start from the assumption that the success of this type of mathematical task Maple requires, beyond the knowledge of relevant controls and syntax, learning specific instrumented techniques, learning that must be borne by the institution. In the thesis, a technique called geometric representation screen concerned with this view a central place, being seen as a way to force interaction between analytical and graphical representations. The work includes an institutional analysis (ecological study programs and manuals) from the perspective of teaching multiple integrals and the integration of the Maple tool, and two experiments without and with Maple.

Quantitative research is the primary tool the necessary information for planning and decision-making when appropriate hypotheses about the behavior of consumers have already been formed. The basis of quantitative research methods are always precise mathematical and statistical models that allows a result has no views and assumptions, and accurate quantitative (numerical) values of the studied parameters. The main merit of quantitative research is that they reduce the risk of making wrong decisions and choices inaccurate scheduling options. The belief that without the study, all aware of the market, often results in inadequate and insufficiently thought out effective action in the market and reminds the trial and error method. Despite the huge variety of research methods and techniques, the overall scheme of activities carried out within the framework of market research, is quite simple and straightforward. For this study, the following method is used

- Interviews and surveys;

- Register (monitoring);

- Panel;

- Expert review.

Interview (interrogation) is clarification of the position of people or getting them to help with any question. The survey is the most common and important form of data collection in marketing. Approximately 70% of this research using this method. The survey is taken (personal) or written. In this the sample is asked to respondent the questions about the teaching and learning calculus with Maple software.

Personal (Face-to-face) and telephone interviews called interview.

For the personal interviews about the Maple software, the students called and asked about their experience of using Maple software. Telephone interviews are a relatively cheap method of conducting surveys of any level of accuracy in terms of sample design (the geographical location of the respondents does not matter in terms of the cost of the interview). This method is applicable only in quantitative research. However, there are objective disadvantages of using this method:

- not quite full control and understanding of the sincerity of the respondent;

- there is no way to present visual materials (samples, cards multiple choice);

- unreliability long interview (by phone is difficult to keep the attention of the interlocutor more than 15 minutes);

- In cities with low levels of teledensity is impossible to obtain a representative sample.

- Interviews face-to-face can be formalized and formalized.

Unstructured interviews are a specific method of data collection, in which there is only a theme and purpose. In these interviews, formally questions were asked about the teaching and learning of calculus. The specific circuit of the survey, no. This makes it possible to identify the underlying motives of action of the consumer, the study of both rational and irrational reasons for its consumer behavior. In practice, formalized interview used in qualitative research. Unstructured interviews are individual and group.

Individual formalized interviews are conducted with the respondent alone in the form of a dialogue; in this case the respondent has an opportunity to make a detailed judgment on the investigated problem. You can select individual forms of unstructured interviews as in-depth interviews and lounge - tests.

In-depth interviews are a series of individual interviews on Maple software, conducted pursuant to guide the discussion. The interviews were conducted by trained skilled interviewer who is well versed in the subject; he has a technique and psychological techniques of conversation. Each interview lasts for 15-30 minutes and is accompanied by the active participation of the respondent - it lays out cards, drawing, writing, etc. In-depth interviews, in contrast to the structured applied in a quantitative survey, allow a deeper insight into the psychology of the respondent and better understand his point of view, the behavior, attitudes, stereotypes, etc. In-depth interviews, in spite of the large (compared to the focus groups) time costs, are very useful in situations where the atmosphere is undesirable group discussion. It is necessary in the study of specific problems and situations, which is not to say in a wide range, or when the individual points of view may differ significantly from the socially approved behavior - for example, when discussing relations between the sexes, sex, certain diseases, hidden political beliefs, etc. In-depth interviews are used for testing and elaboration of the initial development of

advertising (creative ideas), when you want to receive immediate, personal associations, reactions and perceptions - without regard to the group. This method is optimal combination of in-depth interviews and focus - groups with the same respondents. Finally, in-depth interviews are indispensable for conducting qualitative research, especially when the target group make it impossible to collect the respondents in the focus groups - i.e., at one time in one place for 2-3 hours.

Group non-formalized interviews (focused interview, focus - group) - is a panel discussion on **teaching and learning of calculus with Maple software**. "Focus" in such a group - on the subjective experience of people who give their understanding and explanation of the given topic, including all of its nuances. The course is managed by the moderator talks on a predetermined plan and recorded on videotape. As a rule, in the course of the discussion, various projective techniques to find "real" consumer attitudes to the test subject received much deeper and more detailed information than at the level of "normal" communication. Usually, people do not think specifically on those issues, which are discussed in the group, or are unable to compare their opinions with the opinions of other people. During the focus group respondents are asked to assess not just something on the principle of "like - not like", but also to explain his point of view. A subsequent expert analysis of the results allows us to understand the psychological mechanisms of formation of a group of participants' views.

Observation is also performed in this research, which is carried out by means of a systematic, planned to study the behavior of an object or subject. In this Observation unlike polling is independent of the observed object readiness to communicate information. Monitoring - a process of open or hidden from the observed data collection and recording of events or special moments associated with the behavior of the object under study. The object of

observation may be the properties and behavior of individuals; moving things, goods, etc. The downside is the inability to identify the observations of opinions, views and knowledge of people. Therefore, in practice, observation is usually used in conjunction with other research methods.

Numerical methods are the main tool for solving today's applications. The analytical solution of the problem can be found is not always due to the complex, as a rule, non-linear, systems of equations describing the problem. Therefore, numerical analysis of mathematical models - solving method, algorithm, software, computing experiment - is currently the most effective unit of applied research problems. It should also be emphasized computer-oriented nature of numerical methods in the end their implementation is associated with the use of computer technology and programming. However, even the relatively high performance of today's computers does not eliminate the problem of the development of effective and efficient in terms of computational cost solution methods, specialized for specific classes of problems. The optimization problem (modification, modernization) computational methods are still relevant and define prospects of further development of numerical analysis. When teaching students numerical methods of the main forms of training are lectures and laboratory work. Lab is the active form of learning, using a variety of information technology. It should be noted that in any fundamental textbook on numerical methods do not occupy the bulk of algorithms and computational schemes and rigorous study of the methods used, to obtain estimates of the solution, and the convergence of sustainability. This is due to the fact that computational mathematics strict mathematical discipline, which appeared long before computers and computer science, But in the preparation of applied problem solving using computer technology to the fore the choice of methods for solving the issues of algorithms and programming.

. For interview, we have developed a questionnaire scale. To check the validity of scale , we used Cronbach's alpha formula and SPPS software:

Table no 1

Cronbach's Alpha standard table

Cronbach's alpha	Internal consistency
$\geq .9$	Excellent
$\geq .8$	Good
$\geq .7$	Acceptable
$\geq .6$	Questionable
$\geq .5$	Poor
$5 > \alpha$	Unacceptable

Analysis

The scale is tested with the help of SPSS, with the help of Cronbach's Alpha formula. The reliable of the scale is $\geq .7$ which is acceptable for the result. In the educational process, in addition to the classical approach to laboratory work on numerical methods (programming of computational algorithms and their implementation with the help of computer tools) is currently used Maple software. This package are designed to automate solving mathematical problems in

various fields of science, technology and education, integrating a modern user interface, analytical system, numerical methods for solving a fairly wide class of mathematical problems, visualization of results of calculations that at the stage of management decision-making makes it more analyze the reliability of the results, including give them substantial economic interpretation Harnessing the power of mathematical packages not deny students the opportunity to create their own programs implementing numerical methods. Since most packages have built-in algorithmic languages. Thus, in one file, the student receives a minimum of solution of the problem in three ways, which can be compared, to assess the accuracy and to draw conclusions about the effectiveness of the methods. Another argument in favor of the use of mathematical packages - no need a good command of algorithmic languages.

Maple package in varying degrees meet the computing requirements of the environment in the study of numerical methods. To carry out laboratory works on the discipline formed the following requirements to tools computing environment: the usual standard mathematical notation, a visual programming environment, the possibility of symbolic computation, intuitive interface package, the relative simplicity of your computer capabilities. However, it should be noted that the software implementation of numerical algorithms using computer tools allows students to more deeply grasp the fundamentals of the theory and methodology of finding approximate solutions to mathematical problems. In the process of learning the numerical methods in laboratory work various information technologies are appropriate. As a result of studying the course of numerical methods the student should not only get the basic mathematical knowledge in this discipline, but also to improve their basic skills in the use of the latest computer technology applied to computational mathematics.

With the help of survey, the following data is collected. The data is shown below:
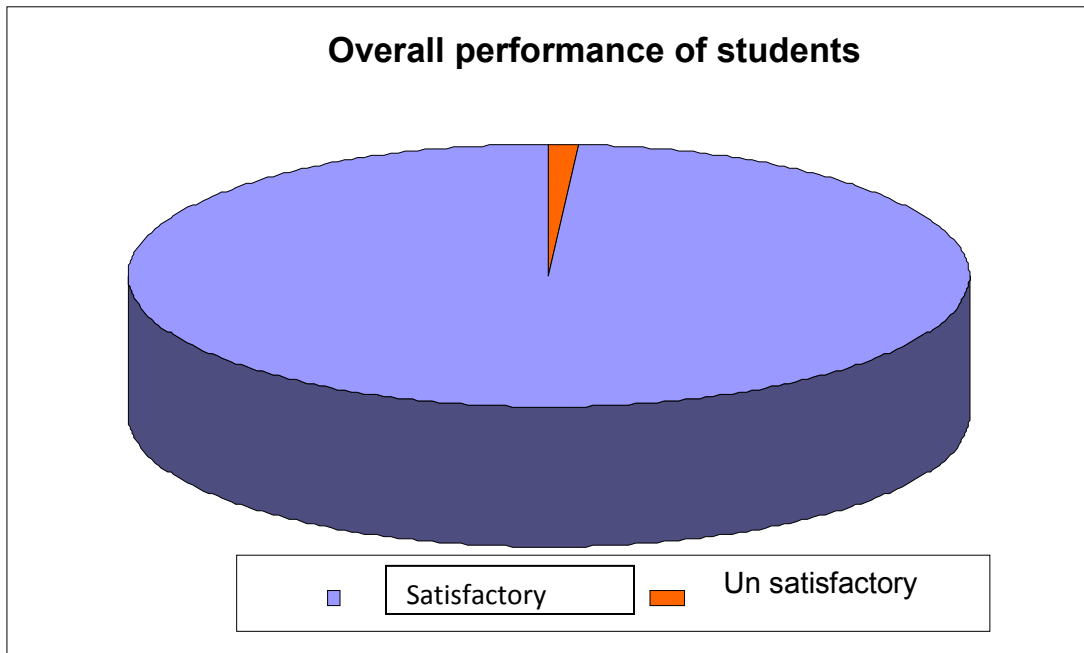
Table no.1: Data obtained from students regarding level of Maple software

Subjects	Scores
1 Male	20/20
2 Male	19/20
3 Male	18/20
4 Male	16/20
5 Male	18/20
6 Male	19/20
7 Male	20/20
8 Male	16/20
9 Male	20/20
10 Male	18/20

11 Male	19/20
12 Male	19/20
13 Male	16/20
14 Female	15/20
15 Female	15/20
16 Female	19/20
17 Female	20/20
18 Female	20/20
19 Female	20/20
20 Female	17/20
21 Female	18/20
22 Female	19/20
23 Female	17/20
24 Female	15/20
25 Female	12/20
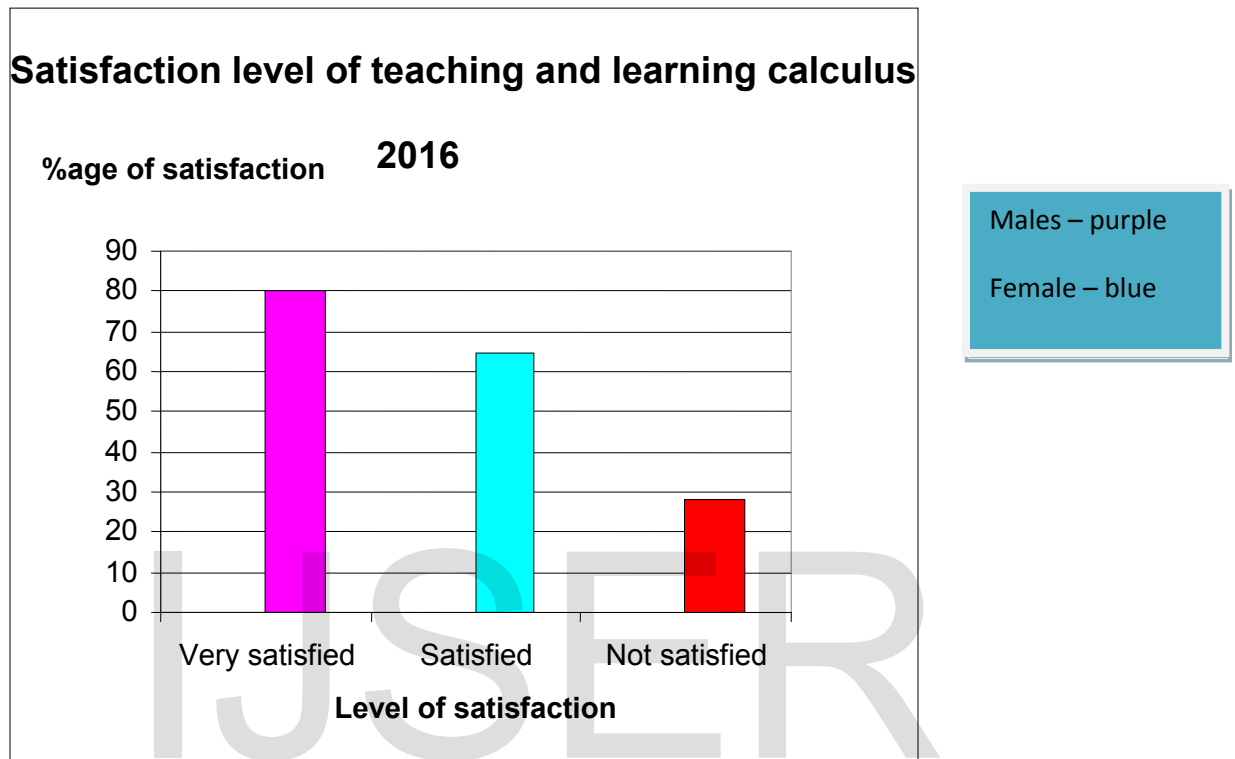
By this analysis, it is found that the overall performance of students with learning and

teaching calculus software organization is satisfied. With respect to the general population

unstructured interview, it is people given positive feedback with respect to the software.

Overall performance of students

Legend: Satisfactory — Un satisfactory

Data obtained from students regarding the calculus with Maple software

Maple can easily develop databases of questions on a variety of technical and scientific subjects. Maple is already widely used, among other for the placement test in American Universities and also in many institutions. It can be used as a help online environment for students, allowing them to train at their own pace. It is also ideal for relieving teacher's correction effort while allowing instantaneous and advanced analysis of the level of a given population of students, improve teaching effectiveness. Web technology employed by Maple TA enables large scale deployment (eg at an academy), and the pooling of exercises banks.

The Maple mathematical computing software is used for many years to teaching in calculus. Maple is an online environment for building exercises banks and publishes exams and homework for students. Maple is already used in many institutions and for the placement test to American Universities. The added value of Maple is the fact that the construction issues and the

automatic correction rely on the power of Maple. Maple is installed on a web server (under Tomcat). It consists mainly of Maple software for the construction of questions and a Web application for editing issues, publishing online reviews and management of notebook. Maple system also provides tools we will not discuss here, to focus only on issues related to education. Access to the server is through a web browser. To access the Maple server simply a fast internet connection and a web browser with Java enabled option. No other tool is required locally on the client machine.

By the analysis, it is found that maple is a computer algebra system which allows both to work on numerical quantities (whole, real, complex) with polynomials, functions or series. It also allows students to make derivations, integrations, resolutions of linear equations, matrix calculations, asymptotic expansions and resolutions of differential equations in symbolic form, that is to say keeping the unknown parameters (initial conditions not explicit) in the resolution. Maple can be used to conduct numerical and symbolic computation, allows to model multi-technology systems and provides tools for the preparation of technical documentation. Maple computing platform provides a solution to a wide range of engineering, mathematical and scientific problems. Novice users to Maple system provides learning tools and tools for stepping through solving the most complex tasks. Specialists provide easy access to additional resources for quick answers to various questions. Maple product is integrated with leading CAD systems, including the popular platform. Maple offers advanced, high-performance means of numerical and symbolic computation with the possibility of presenting mathematical results in the form of detailed technical documentation. The system provides high quality graphics and animation, and provides a set of tools for document editing and management tools visualization results.

Maple language significantly expands the possibilities of intelligent system Maple in respect of two important classes of calculus problems with exactly specified rational coefficients: linear least-squares problems and generalized matrix treatment. This complex may serve as a model for a similar extension of other popular computer algebra systems. User-skilled complex provides a useful means of investigation and numerical solution of specific problems of these classes. At the same time it can serve as a support to training courses on these topics in calculus.

Maple complex procedures, arising as a result of this work are a significant expansion of the intellectual capacities of Maple system in the area of least squares and generalized matrix inversion problems. The expert, this complex provides useful means of investigation and numerical solution of specific problems of these classes. At the same time the complex can serve as a support to training courses on these topics.

The student must have a number of prerequisites. Indeed, the actions that will be able to implement involve geometric concepts (mediator, segment bisector, for example), as well as schemes of action (how does one draw a mediator?) . In some cases, the software will support actions but these are not always clearly explained. To understand the evolution of constructed objects on the screen, students will also use mental images or knowledge of space. Thus, during deformation or modification of a triangle, it will be able to understand why some items disappear when one of the angles is obtuse.

In general, students can hardly develop itself without support in this type of software. He will need the support of a statement given by a teacher and from which it will carry out educational activities (it will recognize the elements statement or trying to imitate a result),

conceptualization (it will identify elements from which build new elements), and application (reproduction instructions) .If in addition to the statement, the student has the teacher's support, he will be able to implement exploration and mobilization or problem solving. The learning model underlying these environments is a constructivist model. Instructor focused methodology: On the one hand, educators can utilize a formerly arranged. By making the comparing dynamic figure before their lesson instructors spare time amid their classes and can utilize the development for lesson arranging. Then again, instructors could likewise make these elements figures on the fly amid their lesson, permitting them a more adaptable showing style where they can respond to understudies' inquiries, recommendations, and guesses.

Researchers use a package Maple as an important tool in solving problems related to their studies. The package is ideal (by today's standards) for the formulation, solutions and research of various mathematical models. Its algebraic means significantly expand the range of problems that can be solved on a qualitative level. Teachers in secondary schools, colleges and universities are updated traditional curricula by introducing problems and exercises that use interactive math and physics of Maple, while students can concentrate on the important concepts and not on tedious algebraic calculations and conversions. Finally, engineers and experts in the industry use a package Maple as an effective tool, replacing many traditional resources such as reference books, calculators, spreadsheets, editors, and programming languages. These users can easily solve a very wide range of mathematically oriented tasks, developing projects, and combining the results (as numeric and graphical) of computing in professional reports of sufficient quality.

Maple embodies the latest technology symbolic computation, numerical calculations with arbitrary precision, availability of innovative Web -components, extensible user interface technology (Maples), and highly advanced mathematical algorithms to solve complex

mathematical problems. At present, the package uses more than 3 million students, scientists, researchers and experts from various fields. Virtually every major university and research institute in the world, including such as the MIT , the Cambridge , the Stanford , by Oxford , the Waterloo et al., Used a package for educational and research purposes. The package is used for industrial purposes such leading corporations al (Wu, L., Liu, J., & Li, 2015).

Calculus is the mathematical analysis of a section of related mainly with the concepts of derivative and differential functions. In differential calculus studied the rules for calculating derivatives (differentiation laws) and the use of derivatives to the study of the properties of functions. For the teaching and learning Maple is becoming increasingly popular for solving mathematical problems of teaching-oriented disciplines in research and industry. These systems are powerful tools for scientists, engineers and teachers. Research-based technology usually combines algebraic methods with advanced computational methods. In this sense, the interdisciplinary area between mathematics and computer science, in which the study focused both on the development of algorithms for symbolic (algebraic) computations and processing on computers, and on the creation of programming languages and software environment for the implementation of such algorithms and based on their different tasks destination.

Conclusion

Modern software is playing an important role in teaching calculus to the students. Maple software is one of them. Maple software is a system that will be useful for mathematicians, teachers, engineers, researchers and scientists, who are faced with the design calculations, logical modeling. Maple supports both two-dimensional and three-dimensional graphics. Students can imagine the explicit, implicit and parametric functions, and multi-dimensional functions and simple data sets in graphical form, two-dimensional graphs of several functions, create graphs of conformal transformation functions with complex numbers and plot functions in a logarithmic, double logarithmic parameter, phase, polar contour and shape. Maple can build surface curves in three-dimensional representation, including the surface, given the explicit and parametric functions, as well as solutions of differential equations. Thus there is possibility of presenting in the form of two- or three-dimensional animation.

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