



## A Review of Various Visualization Techniques for Programing Courses

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**Abstract--** Any technique for producing pictures, graphs, or animations to convey a message is known as visualization. Since the beginning of time, visual imagery has been an important way to express both abstract and concrete ideas. Visualization has become an awfully important part of human life and academic life without which all things are not so clear and also becomes boring. In the existing system, we find so many problems like no real life example, while study student feels left out, difficult to understand the tough concepts and student do not have practical knowledge in the beginning of programming courses. While figuring out these drawbacks from the existing system we decide to build a system that provides the best out of the best visual learning experience for students. The animation tools were used to create the visual learning website. The proposed system helps students in discovering specific topics in object-oriented programming concepts. During the development of the visual learning system, we conducted a survey with active students. In terms of usability and learning skills, an assessment of the proposed visual learning system revealed fairly satisfactory results.

**Keywords:** visual learning, object oriented programming

### INTRODUCTION

With the advancement of technology, life is getting simpler and easier altogether aspects. Because the rapid technology change always aims to serve mankind, the expectation for living a straightforward yet advanced life keeps on increasing. Visualization has become an awfully important part of human life and academic life without which all things aren't so clear and also becomes boring. Visualization could be a technique for creating pictures, diagrams, or animations to talk a message or which makes anything interesting. To improve cognition, a computer-assisted, responsive, visual representation of abstract data is used. The aim is to use visualization tools to help people understand things better. The theory behind visualization is to make use of the human brain's efficient image processing abilities. Human cognitive resources are increased by visualization.

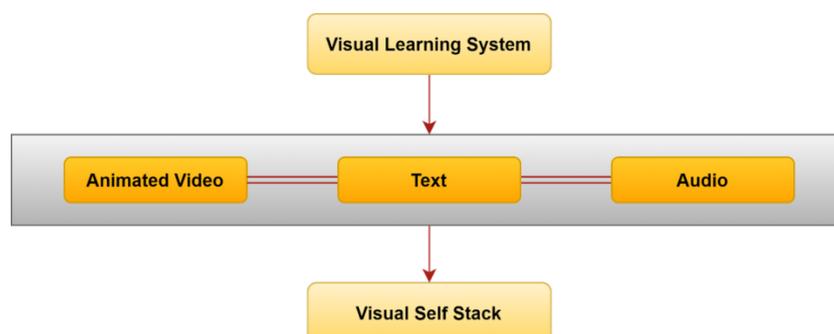


Figure 1 Visual System Components

They improve pattern recognition by extending recall, reducing data search time, and increasing the attractiveness of templates. There are many advantages of using visualization these are:-Facilitates and improves learning visual build information simple to understand and eliminate language and acquirement barriers. Symbols are recognized quicker than text because it is found that symbols are often recognized quicker and extra accurately than text which the graphical attributes of icons like form and color unit of measurement helpful for quickly classifying objects, components, or text by some common property. These icons permit speedy recognition of the sort of message being conferred. A more attractive and direct manipulation system may be a lot of entertaining, cleverer and appealing. May consume fewer area icons might take up less space than the equivalent in words. Smooth transition from query language system, moving quite a source language to an on the spot manipulation system is easy. The disadvantage of visualization illustration of knowledge generally concerns the value of human effort and resources, the tactic of selecting the foremost acceptable visual and tabular illustration of knowledge, larger style quality of visualization knowledge, and also the potential for human bias. Nowadays without visualization techniques, all things become very difficult for us to grasp. Technology, education, engineering, object-oriented database management systems, medicine, and other fields have all benefited from the advancement of visualization, as has the growth of animation. For doing visualization there are many software tools present within the market which include Google Charts, Tableau, and Infogram, etc.

## Virtualization

Visualization intends to assist fellow peer coaches to think about using Visualization as a tool in their coaching practices and to explore its infinite possibilities. Research has shown that there's increasing clarity of one's life

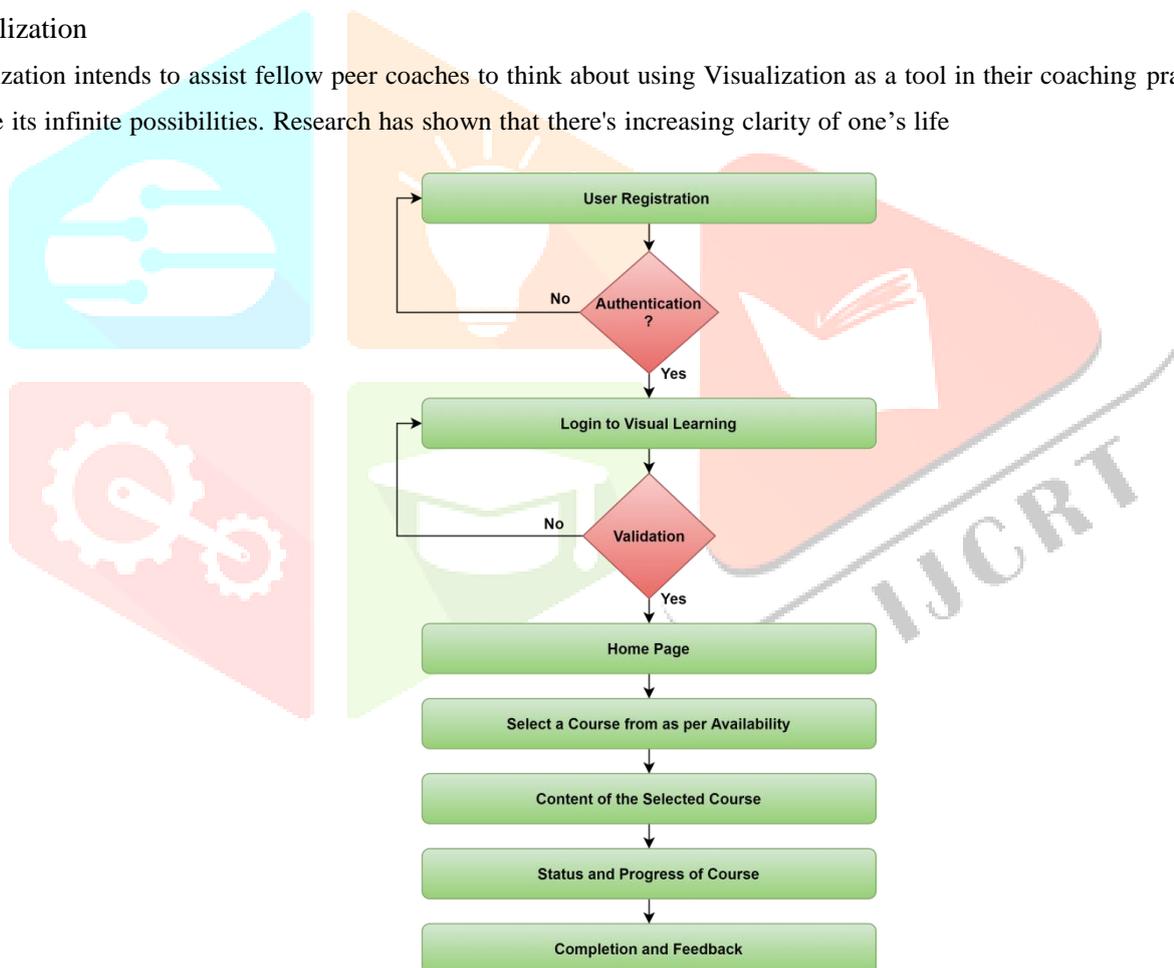


Figure 2 Proposed Visualization system

purpose with regular centering and visualization. One will notice the weather that tends to recur in your dreams, goals, and fantasies and therefore the particular qualities that are there within the belongings you end up doing and creating. During the method of visualization, one might encounter blocks and barriers from within that prevent one from reaching your goals or bringing your best self to each situation. These blocks are created when energy is constricted and not flowing and are usually caused by repressed emotions of fear, sadness, guilt, self-criticism, resentment, and anger which cause someone to restrain and shut up in mind, body, and spirit. Functional individuals become exceptional when there's the alignment of mind, body, and spirit. It is vital to own clarity and awareness of those blockages and barriers to negative emotions and skill the positive emotions that are locked up. Visualization could be a powerful technique to attain this alignment. Visualization is not a magic pill and by

itself isn't enough and cannot get you to your goal. It must be corroborated and complemented with other tools and actions to realize one's goals and make change happen.

## LITERATURE REVIEW

The Visualization Module for e-learning and an e-assessment system for the knowledge structure. Where they argued how visualizations configured by a tutor can help by their program code easier than another device. The concept has been implemented in a very prototype, layout, and shown by example from the data structure. At the end of this stuff, they added more configuration options to the prototype to induce even better results in layout, two main research tasks are considered at the moment. This ends up in additional coloring, making parts of the information structure correct.[1] Sanders et.al. state that quantum computation could also be a fast-growing, multi-disciplinary research field. This research aimed to do and made communicating the aims of quantum computing and future technologies easy. they have created a four-minute animation that depicts a solid-state quantum computer in silicon with stress on simplicity, accuracy, and aesthetics, and this animation has been used numerous times to acclaim. This has made things easy to understand.[2] The visual programming approach and also the strategy for building a model of a posh digital circuit by moving and connecting visual objects will help the scholars with visual kinaesthetic style to internalize the concept and also the structure of the VHDL model. The guidance, provided by the environment as alert and proposals when attempts of connecting non-matching objects are detected, will teach the scholars the way to correctly build a VHDL structure and can form good development skills. The option to pick a design template will help the novice students easily understand the structure of their project assignment and can ease the guidance, provided by the training environment through the development phase. The training environment will benefit mostly the scholars, learning in distance mode, but it also useful for face-to-face students who find it difficult to assimilate the specifics of VHDL modeling.[6] Another research's motive was to assist the teachers to try and made apps for college kids while students were learning more through these apps through visual programming and project-based learning. All K-12 teachers successfully created apps for the classroom subjects that they were teaching K-12 teachers utilized many multimedia components in their applications. Additionally, many students responded positively to the apps developed by these K-12 teachers.[7] An intelligent tutoring system developed to assist students in learning computer theory. And therefore, the intelligent tutoring system was built using ITSB authoring Tool. They have tried to stay the look as simple as possible in terms of explaining the fabric instruction while ensuring that the code takes advantage of the question and finds solutions for those that couldn't answer. An evaluation was administrated to determine the scholar and teacher satisfaction of the tutoring system. The results of the evaluation were satisfactory.[8] Chevalier et.al. has presented a way to compute and visualize evolution patterns in a C++ ASCII document. At the center of their method could also be a structure-and-type matching technique running on the abstract syntax trees of consecutive versions. Their method is useful to detect and browse small to medium-scale changes during ASCII computer file evolution, like function and class-level refactoring code editing. Hence, their work fills the gap between line-level evolution analysis tools, like WinDiff and CVScan, and file and architecture level tools sv3D and CVS grab. They envisage several directions of their work. First of all, the presented visualization is solely a primary try and display the syntactic correspondence. Different variants of the elemental idea should be tired out, like leaving out the unchanged code fragments and showing only the added, modified, and deleted ones. The second different distance function could also be designed to incorporate additional information beyond syntax tree structure. Third, the proposed evolution visualization is often enhanced to scale to point to more versions of larger amounts of code, similarly as more as more code attributes than simply construct type. Finally, both the similar code detection and also visualization method may have the potential to use within the context of finding and understanding software code clones.[3] Another system was presented in terms of the features and implementation to imply the varied characteristics of the proposal. Furthermore, through COLLECE-2.0, the system was integrated into a full collaborative learning environment for programming. The use cases raised exposed the usefulness, scalability, and adaptableness of the system in multiple use cases, which contributed to validating the system in numerous areas like interactive debuggers, its collaborative use within the classroom the tutorial of concurrent programming concepts, and its integration in-game environment oriented toward the tutorial of programming foundation in children. As future lines of labor, they highlight the need to work on two fundamental axes: First, the in-depth study of the benefits that use cases bring around the education of programming. Second,

the analysis of their exploitation in AR environments on mobile devices with current technologies would allow the population with reduced resources access to the system.[4]

Nurbekov et.al. allowed to analyze the effectiveness of a blended approach supported project-based learning, pair, and team programming, using DER for providing interaction and visualizing of learning content and implementation during the hands-on session likewise as analysis of student's cognitive skills through the criterial assessment of developed projects. Furthermore, this work could provide a framework for an instructional design of a methodological system on teaching mobile application development aimed toward the feasible choice of suitable learning techniques and approaches.[5] Traditional textual programming languages have a text-based interface that needs precise and complicated syntax which is unfamiliar and unnatural for beginners. The programming syntax is sometimes complicated and difficult to know for novice programmers and syntax overload ends up in barriers to learning programming. Easier to read and easier to jot down programs may relieve syntax complexity for learners. Rather than inputting text-based statements, visual programming environments often contain block-based programming elements which give useful visual cues on how and where to use commands to develop programs. A program may be easily created just by dragging and dropping block-based programming elements so the syntax problems are eliminated. Visualization helps learners perceive the linguistics of introduced constructs, elucidate principles of program structure and execution, and protects them from developing misconceptions. It appears that visual-based programming is beneficial for inexperienced programmers in a programming implementation environment. Numerous studies have shown the advantages and feasibility of visual programming environments like Scratch, Alice, and Kodu. Since they are easy to use and understand, visual programming environments are used as lead-in courses for more advanced computing courses.[9]

#### METHODOLOGY:

We performed an analysis of several visualization systems and also conducted a survey based on these results, and we've concluded that written media is more difficult to comprehend than visual media. Visuals divide content into smaller, less complex device chunks, and when used correctly, they have greater comprehensibility than text-based elements or the best audios. Furthermore, the effects of visuals among college students contribute to emotions, making what you're eLearning more impactful and better including text. In addition, we learn that ninety percentages of academics prefer visual learning to conventional learning.

Given below are the survey question that we've got asked and responses:

*Which method does one prefer for effective Learning?*

In figure2, we get to learn that 95% learners out of 100% finds visualization learning more effective and understandable as with respect to traditional learning. As learners find visual learning helps them to learn more concept so it will directly more effective as compared to that of traditional learning

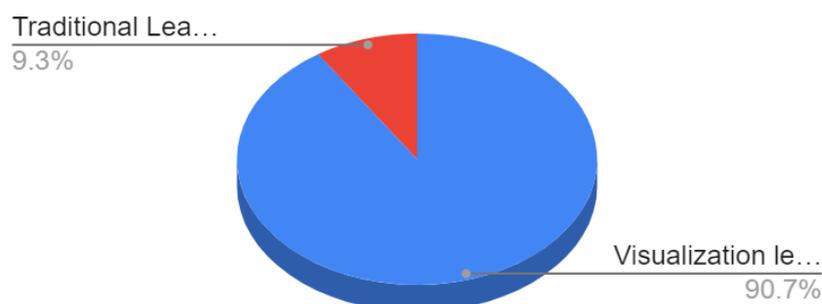


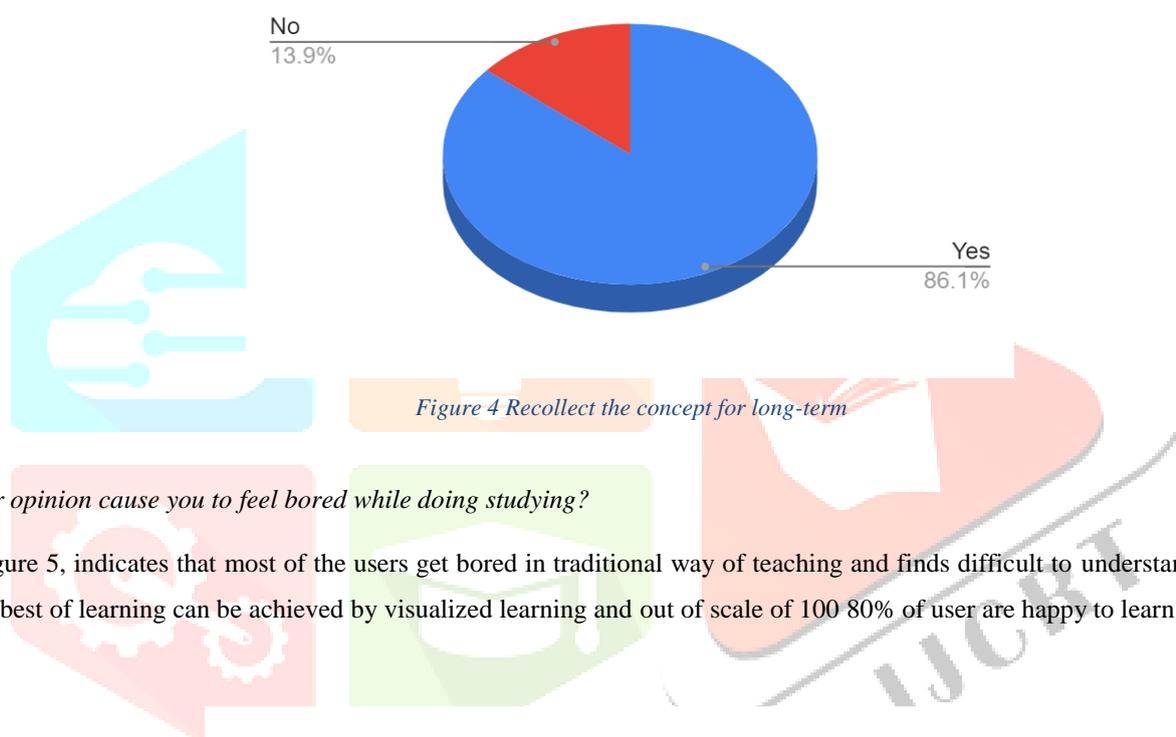
Figure 3 Effective learning Method

*Is Visualization learning facilitate you recollect the concept for the long term?*

In figure 3, remembering the concepts for long term visualization is more effective as compared with traditional way of learning. 93% of responses are in favor of the way of learning visually which helps them to remember the concept for long term in future. So, visualization learning is the most efficient method for learning. Visuals stay in LTM better than printed media or traditional approaches: We observed from the literature review and survey that both short-term and long-term memory store data in chunks, but this is limited. Doing ideas with significant images is one of the best ways to ensure that learners store knowledge in their memory.

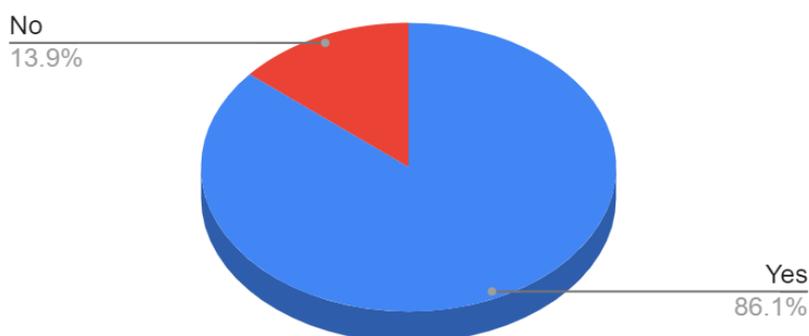
*Sometimes traditional learning is difficult to grasp the concepts?*

In figure 4, we get the idea that learners find difficult to understand the traditional learning method. 86% of the learners are not able to learn the concepts and need more assistance through visual learning. Turn on screen reader support which will help them to understand the concept in much easier way.



*In your opinion cause you to feel bored while doing studying?*

The figure 5, indicates that most of the users get bored in traditional way of teaching and finds difficult to understand the concept. So the best of learning can be achieved by visualized learning and out of scale of 100 80% of user are happy to learn visually.



*Figure 5 Difficult to understand the concepts*

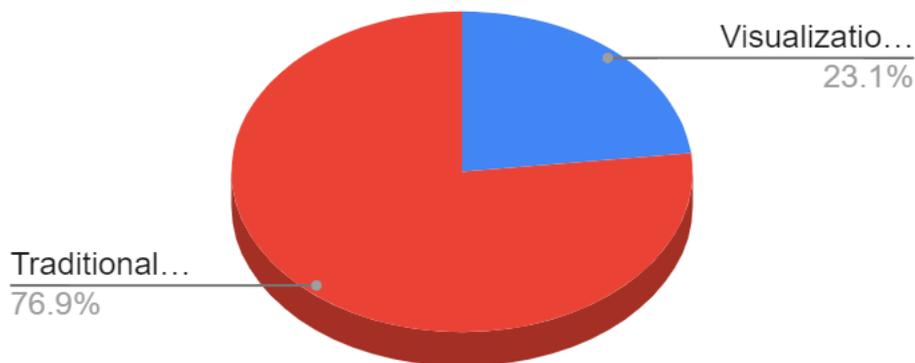
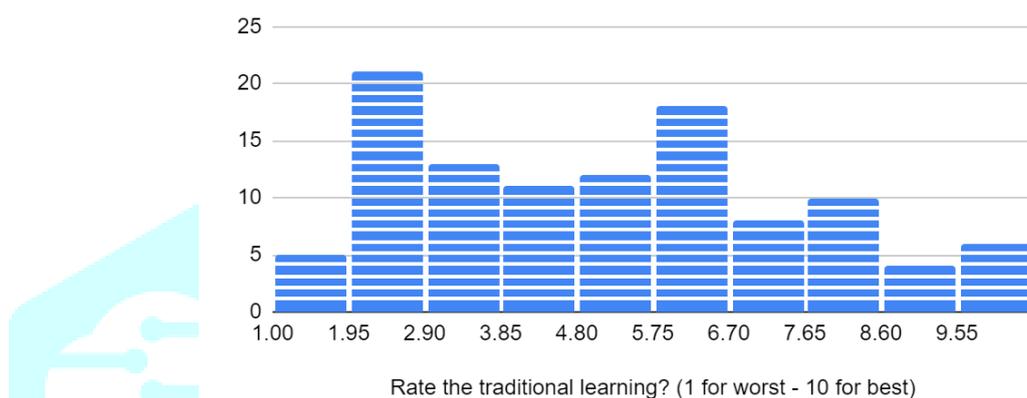


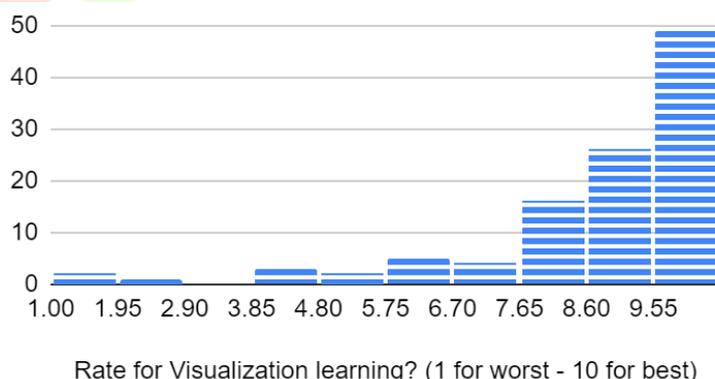
Figure 6 While Study feels bored



Rate the traditional learning? (1 for worst - 10 for best)

Figure 7 Rate the normal learning.

From the graph we can clearly get the idea that most of the user are in of visualization learning over traditional learning. Out of total responses 90 responses is for visual learning which directly indicates that users are more comfortable in visual learning 82% is a good outcome for developing the website that helps to learn the concept visually. So, from the survey and literature review, we've decided to create an internet site for visual learning of courses. We have made a website for visualization of OOPs concept. Firstly we've got taken the contents and so started designing the website afterward we've designed animated videos of the topics and audios of the content for the user suitability if the user wants to find out more. Attached all the items with the website. And that we are taking feedback from the user if any improvement or any special topic user wants then we are adding.



Rate for Visualization learning? (1 for worst - 10 for best)

Figure 8 Rate the visualization learning

**STATEMENT OF LIMITATION:**

Our research will help to understand the importance of visualization. Things are difficult to know without visualization and also become boring without visualizations. Most people prefer visualization learning to traditional learning and from our survey, we have to be compelled to know that approx. 90% of individuals are kin towards visualization learning. Visualization makes things easy to Know and engages people more.

There is also some weakness of visuals, the utilization of visuals may deter learners. It's important to notice that graphics also

can negatively impact learning if they're used inappropriately. While off images, such as those used for purely decorative purposes, appear on the screen, learners will attempt to deduce the message and intent of the picture subconsciously. On the other hand, when developers strategically position well-chosen images within a course, they can increase comprehension and perspective. Pictures, unlike text, can enhance communication and generate an emotional response. It's necessary to use images that reflect real objects, individuals, or places and simplify complex or abstract concepts to use visuals in a way that reinforces course material and facilitates learning. Digital learning designers can only use images with a straightforward value; otherwise, they will be a nuisance at best and will give learners the wrong impression at worst.

## CONCLUSION:

Visualization learning website for teaching students object-oriented programming was designed and developed using animation tools .we have tried to stay the planning as simple as possible in terms of explaining the fabric instruction, while ensuring that the scholars take the advantage of the question and find the solutions for those who couldn't answer. An evaluation was disbursed to work out the student's satisfaction with the visualization learning website. The results of the evaluation were satisfactory. In the future, we'll increase the subject to hide a greater range of educational material increases the number of the question of every topic.

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