Journal of Engineering Sciences and Information Technology (JESIT) • Vol 7, Issue 3 (2023) • P: 43 - 33
https://journals.ajsrp.com/index.php/jesit
ISSN: 2522-3321(Online) • ISSN: 2522-3321(Print)

A Theoretical Comparative Review of Computer-Aided Landscape Design Tools: Features, Benefits, and Limitations

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Received: 30/04/2023
Revised: 12/05/2023
Accepted: 24/05/2023
Published: 30/09/2023

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Citation: Mandani, S. A., & Aljasem, A. E. (2023). A Theoretical Comparative Review of Computer-Aided Landscape Design Tools: Features, Benefits, and Limitations. *Journal of engineering sciences and information technology, 7*(3), 33 – 43. https://doi.org/10.26389/AJSRP.C300423

Abstract: This study presents a theoretical comparative review of computer-aided landscape design tools, focusing on their features, benefits, and limitations. The aim is to provide landscape professionals with a comprehensive understanding of different software options available for their design projects. The study explores popular tools such as SketchUp, AutoCAD Architecture, Chief Architect, Revit, and Home Designer Suite, analyzing their capabilities and suitability for landscape design. Additionally, classification criteria for assistance programs in landscape design, including price, two-dimensional design, printing, integration with other architectural programs, lighting, blooming sites, botanical library, plant growth simulation, and land topography, are discussed. The study concludes by offering valuable insights and recommendations for professionals to make informed decisions when selecting computer-aided landscape design tools.

Keywords: Computer aided , design , landscape design, Innovation

مقارنة لـ دوات تصميم ا لمناظر الطبيعية ا لمعززة بالحاسوب: ا لميزات والفوائد منـ ةراجعظرية ووياللقد

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[1] الهيئة العامة للتعليم التطبيقي والتدريب | الكويت

المستخلص: يقدم هذا الدراسة مراجعة نظرية مقارنة لأدوات تصميم المناظر الطبيعية المعززة بالحاسوب، مع التركيز على الميزات والفوائد والقيود. الهدف من الدراسة هو توفير فهم شامل للمهنيين في مجال التصميم البيئي للأدوات المختلفة المتاحة لمشاريع التصميم الخاصة بهم. تستكشف الدراسة الأدوات الشهيرة مثل SketchUp و AutoCAD Architecture و Chief Architect و Revit و Home Designer Suite، وتحلل قدراتها وملاءمتها لتصميم المناظر الطبيعية. بالإضافة إلى ذلك، يتم مناقشة معايير تصنيف برامج المساعدة في تصميم المناظر الطبيعية، بما في ذلك السعر والتصميم ثنائي الأبعاد والطباعة والتكامل مع برامج معمارية أخرى والإضاءة ومواقع التفتح والمكتبة النباتية ومحاكاة نمو النباتات وتضاريس الأرض. تختتم الدراسة بتقديم رؤى قيمة وتوصيات للمهنيين لاتخاذ قرارات مستنيرة عند اختيار أدوات تصميم المناظر الطبيعية المعززة بالحاسوب.

الكلمات المفتاحية: التصميم المعزز بالحاسوب، التصميم، تصميم المناظر الطبيعية، الابتكار.

Introduction

Due to the rapid development of technology and science, the increasing number of designers using computer-aided design software has become the main method of working. It has become an integral part of the design process, as it allows them to achieve high-quality and accurate results(Theidel, 2021).

The use of computer-aided design has become an integral part of the design process, as it provides high-quality and accurate results. For landscape design, it can help the designer to create a more effective and efficient design. Besides being able to perform various tasks, such as analysis and presentation, the designer can also save time by using a computer-aided design. With the help of computer-aided design software, designers can now create a more direct design for their projects. It also allows them to improve their communication and make their work more effective. The use of computer-aided design can greatly affect the design concept, analysis, and presentation(Lallawmzuali & Pal, 2023).

The aim of studying Computer-aided design (CAD) and landscape design is to gain a deep understanding of the tools, techniques, and principles used in designing landscapes and outdoor spaces using computer software. This involves exploring the various applications of CAD in landscape design, such as the use of 3D modeling, rendering, and simulation software to create realistic designs.

Furthermore, the study aims to identify the challenges and opportunities associated with the use of CAD in landscape design, such as issues related to sustainability, adaptability, and user experience. By understanding these challenges, the study can provide insights into potential solutions and recommendations for future research.

The study also aims to explore the potential benefits of using CAD in landscape design, such as improved efficiency, cost-effectiveness, and increased accuracy. By identifying these benefits, the study can provide practical applications for professionals working in the field of landscape design.

Overall, the aim of studying CAD and landscape design is to advance the knowledge and understanding of how computer software can be used to design landscapes and outdoor spaces in a more efficient, sustainable, and user-friendly manner.

2.Related works

Sun and Chen (2020) discussed the application of CAD in landscape design. They reviewed various CAD tools and techniques, including 3D modeling, rendering, and simulation software, and discussed their potential applications in landscape design. They also discussed the benefits and limitations of using CAD in landscape design.

Chirico and Gargiulo (2017) explored innovative methods in CAD for landscape architecture. They reviewed various CAD tools and techniques, including 3D modeling, geographic information systems, and simulation software, and discussed their potential applications in landscape design.

Bucur and Balan (2019) conducted a literature review of the role of CAD in landscape architecture. They found that CAD tools can assist in the design process by enabling the visualization of complex designs, improving communication between stakeholders, and supporting the integration of sustainable design principles.

Kiani and Khandelwal (2018) examined the applications of CAD in landscape architecture. They found that CAD can help designers to create complex designs more efficiently and accurately, and that it can be used to support sustainable design principles.

Bozorgmehr et al. (2018) investigated the role of Computer-Aided Design (CAD) in landscape architecture. They conducted a survey among landscape architects in Iran and found that CAD is a widely used tool in the design process, and it helps to increase the accuracy and speed of the design process.

3 Study methodology

3.1 Study Design:

This study adopts a theoretical comparative review design to examine and compare various computer-aided landscape design tools. The aim is to provide a comprehensive understanding of the features, benefits, and limitations of these tools. The study design involves conducting a literature review and analyzing the findings to draw meaningful comparisons.

3.2 Data Collection:

During the literature review, relevant studies, articles, and publications are collected for analysis. The collected data includes information on different computer-aided landscape design tools, their features, benefits, and limitations. The data collection process involves extracting key information and organizing it for further analysis.

3.3 Comparative Analysis:

The collected data is then analyzed using a comparative analysis approach. The analysis involves categorizing the data based on specific criteria, such as price, two-dimensional design, printing, integration with other architectural programs, lighting, appropriate blooming sites, trees and botanical library, plant growth simulation, and land topography. Each tool is evaluated and compared within these categories, highlighting their respective features, benefits, and limitations.

4. Computer-Aided Landscape Design's Influence and Significance

4.1 On the Conversion Between 2D &3D

When it comes to landscape design, stylists tend to pay more attention to the space within it. This is because they need to think about the various elements and spatial scale of the space. In addition to this, they also need to analyze and translate the painting's attributes into a coherent whole(Jiang & Zhang, 2019).

When it comes to the design process, the designers always need to convert their ideas into 2D and 3D space information forms. This process can be carried out through the use of computer-aided design software. In addition to being able to analyze and translate the various elements and spatial scales of the space, the designer can also use the software to visualize their ideas. One of the most common reasons why stylists spend a lot of time thinking about the design concept is because they are not able to effectively represent it in 2D(Y. Liu & Xu, 2021).

One of the most important factors that landscape designers need to consider when it comes to the conversion between two-dimensional and three-dimensional images is the ability to create a simple and accurate 3D image description. With the help of computer-aided design software, they can now easily understand the effect of both external and internal space. In addition, they can also use the software to support the animation(Yan, 2014).

Real-time programs for house design are software applications that allow users to create, visualize, and modify house designs in real-time(Sun & Chen ,2020). These programs provide interactive tools and features that enable users to design and customize various aspects of a house, including floor plans, room layouts, interior design elements, and exterior features. Here are a few popular real-time programs for house design:

1. SketchUp: SketchUp is a widely used 3D modeling software that offers real-time design capabilities. It allows users to create detailed 3D models of houses, add textures, and apply realistic lighting. It also provides a user-friendly interface and a vast library of pre-made 3D objects for easy customization(Bozorgmehr et al. 2018).
2. AutoCAD Architecture: AutoCAD Architecture is a professional-grade CAD software that specializes in architectural design. It offers real-time editing and visualization tools, allowing users to create and modify house designs with precision. It includes features like 3D modeling, rendering, and documentation tools for creating detailed architectural plans(Chirico & Gargiulo 2017).
3. Chief Architect: Chief Architect is a comprehensive home design software that provides real-time design capabilities. It offers tools for creating 2D and 3D floor plans, interior and exterior designs, and landscaping. It also includes features for realistic visualization and walkthroughs, allowing users to experience their designs in real-time(Bucur & Balan 2019).
4. Revit: Revit is a Building Information Modeling (BIM) software widely used in architecture and construction industries. It offers real-time collaboration and design capabilities, allowing multiple users to work on the same project simultaneously. It provides tools for creating detailed 3D models, generating construction documents, and visualizing designs in real-time(Chirico & Gargiulo, 2017).
5. Home Designer Suite: Home Designer Suite is a user-friendly software that offers real-time design capabilities for house design. It provides intuitive tools for creating floor plans, customizing interiors, and designing exteriors. It also includes features for 3D visualization and virtual walkthroughs (Kiani& Khandelwal 2018).

These real-time house design programs offer a range of features and capabilities to assist users in creating and visualizing their house designs in a dynamic and interactive manner(figure1).

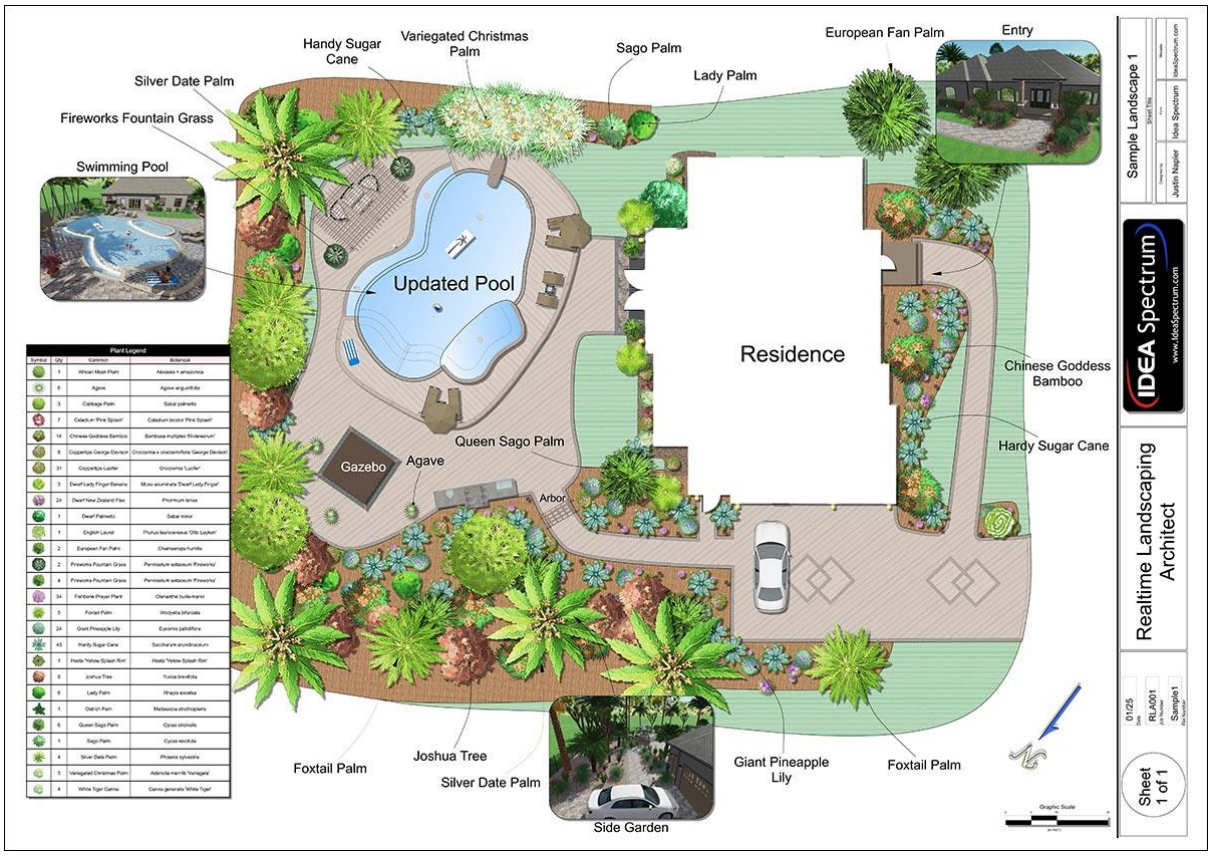

Figure1 Real time program house design

4.2 3D Space Display

The internalization of a landscape design process is only one aspect of it. More by three-dimensional space indicates better communication with others(Cheng et al., 2020).When the concept of the display design is more visual, it is important that the designer uses computer aided design software. This type of software can help them to create a more accurate and comprehensive 3D space display. In addition to being capable of analyzing and translating the various elements and spatial functions of the space, the designers can also use the software for creating an efficient and clear project(Beyl, 2019).

For instance Simultaneous 2D and 3D design is a feature or capability offered by certain software tools that allows users to work on both the 2D floor plans and 3D models of a design simultaneously. This feature enhances the design process by providing a seamless integration between the 2D and 3D views, enabling users to make changes in real-time and see the immediate effects on both representations(Chirico & Gargiulo 2017).

When using simultaneous 2D and 3D design, users can start by creating the basic floor plan in the 2D view, defining the layout, dimensions, and placement of walls, doors, windows, and other architectural elements. As they make changes in the 2D view, the corresponding modifications are reflected in the 3D model, allowing users to instantly visualize the impact on the overall design(Beyl, 2019)..

Conversely, users can also make adjustments directly in the 3D view, such as manipulating objects, adding furniture, adjusting lighting, and applying materials. These changes are automatically synchronized with the 2D floor plan, ensuring that the two representations remain consistent and up to date.The benefit of simultaneous 2D and 3D design is that it provides a more intuitive and efficient workflow. Designers can easily switch between the 2D and 3D views, gaining a comprehensive understanding of the spatial relationships and aesthetics of the design. This feature allows for better communication and collaboration, as clients and stakeholders can visualize the design in both 2D and 3D, facilitating a clearer understanding of the final outcome.

Some software tools that offer simultaneous 2D and 3D design capabilities include AutoCAD Architecture, Revit, Chief Architect, and Home Designer Suite. These tools enable users to work seamlessly between the 2D and 3D representations, enhancing the design process and allowing for more accurate and detailed visualization of the project(figure 2).

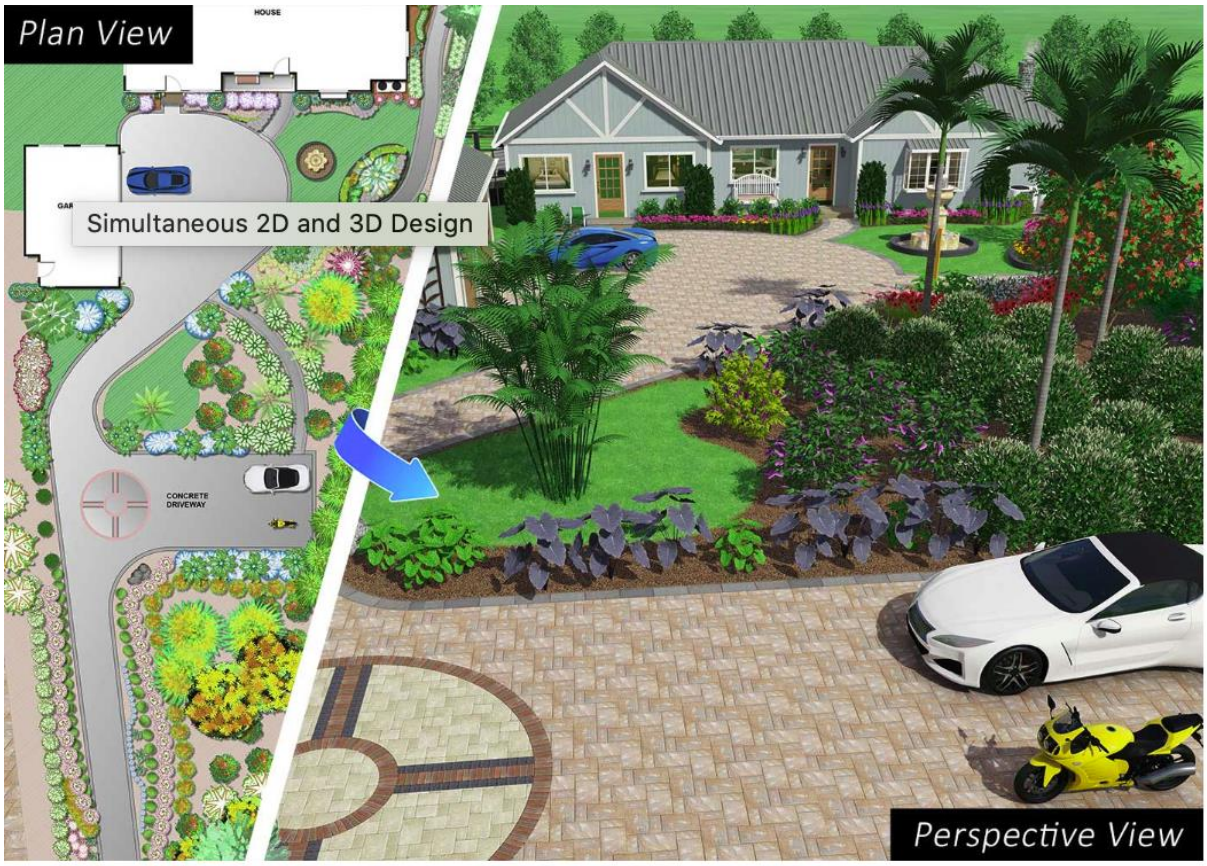

Figure2 Simultaneous 2D and 3D Design

4.3 Innovation of Form

The rapid development and evolution of computer aided design software have made landscape design more accessible and easier to use. This is reflected in the increasing number of people who are interested in exploring and developing new ideas. One of the most challenging factors that landscape designers face when it comes to the design of complex landscapes is the ability to accurately analyze the slope's change. This is because, at times, it is very hard to make a good estimate of the slope impact on the landscape(Huang, 2017).

With the help of computer aided design software, a landscape designer can now get more accurate and timely analysis of the terrain and its various features. It can also help them to determine the optimal location of the roads, bridges, and other structures. This eliminates the need for them to carry out costly calculations and confirm the design(Jia, 2022).

In addition, with the help of CAD, some irrational and illogical designs can also be realized. For instance, designs that emphasize the opportunistic effect and contingency can transform from formal beauty into more unpredictable and dynamic forms(Z. Li, 2020).

Tschumi, a landscape designer, broke away from the conventional composition and order principles when he designed the French Parc De la Villette. He used three abstract systems to form its framework. These include the plane, line, and point(Ye, 2019).

Due to the increasing number of people who are interested in learning more about the importance of ecological design, it has become a popular topic in landscape design. This is because it allows them to restore the original ecological structure and texture of the Earth. In addition to being able to analyze the various aspects of the landscape, computer-aided design software can also help them to create a more accurate and timely environmental simulation(T. Liu, 2022).

As an example Designing irrigation systems involves creating a plan for efficiently delivering water to plants, lawns, or agricultural fields (Beyl, 2019). Several factors need to be considered, such as the water source, plant water requirements, soil type, climate, and the layout of the area to be irrigated. Here are some key steps to design an irrigation system:

1. Determine Water Requirements: Calculate the water requirements of the plants or crops based on their specific needs. Consider factors like evapotranspiration rates, soil moisture levels, and plant types. This information helps determine the water application rate required for the irrigation system(Bozorgmehr et al. 2018).
2. Assess Water Source: Identify the available water source for irrigation, which could be municipal water supply, wells, rivers, or rainwater harvesting systems. Evaluate the water source's capacity and quality to ensure it meets the irrigation demands(Kiani & Khandelwal ,2018).

3. Evaluate Soil Conditions: Understand the soil characteristics, including its type, texture, and infiltration rate. This information helps determine the irrigation schedule and the suitable irrigation methods(Sun & Chen 2020).
4. Design the Layout: Map out the irrigation system layout, considering factors like plant spacing, topography, and water distribution requirements. Determine the number and location of irrigation zones based on plant types, sun exposure, and water requirements(Chirico , Gargiulo 2017).
5. Choose Irrigation Methods: Select appropriate irrigation methods based on factors like plant type, water availability, soil conditions, and water conservation goals. Common irrigation methods include sprinklers, drip irrigation, micro-sprinklers, or a combination of different methods(Bucur &Balan 2019).
6. Calculate Pipe Sizing: Determine the pipe sizes required for the irrigation system based on the flow rate and pressure needed. Consider the pipe material, length, and the pressure loss along the pipeline(Sun & Chen 2020).
7. Incorporate Water Conservation Techniques: Integrate water-saving techniques into the design, such as rain sensors, soil moisture sensors, and smart controllers. These technologies help optimize water usage and prevent over-irrigation.
8. Account for System Maintenance: Consider access points, filtration systems, and drainage requirements to ensure the irrigation system can be easily maintained and managed.
9. Prepare a Cost Estimate: Develop a budget for the irrigation system, taking into account equipment costs, installation, and ongoing maintenance expenses.
10. Obtain Necessary Permits: Check local regulations and obtain any required permits or approvals before implementing the irrigation system (Beyl, 2019).

It's worth noting that designing an efficient irrigation system may require expertise in hydraulic engineering, plant science, and irrigation principles. Consulting with irrigation professionals or landscape architects with irrigation experience can provide valuable guidance throughout the design process.

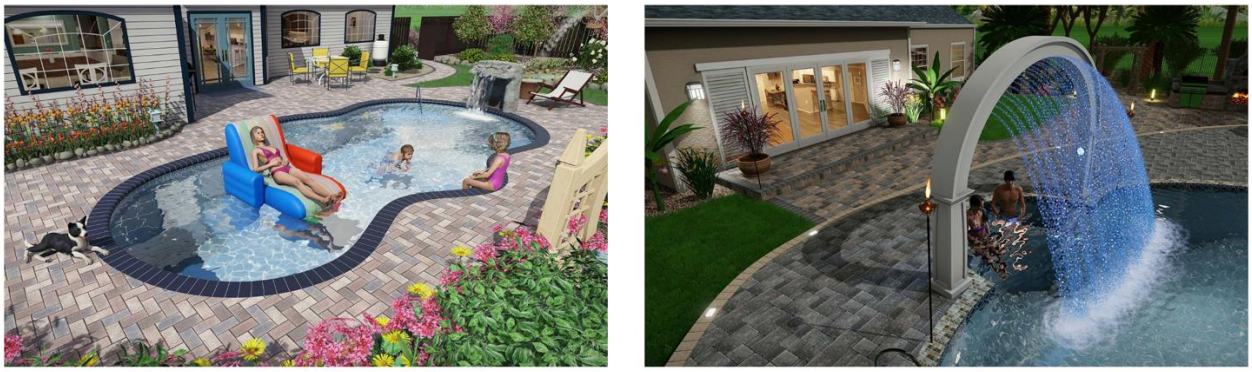

Figure3 Design Irrigation Systems

4.4 Trial and Use of Different Materials

With the help of a computer, landscape architects now have more options when they come to choose materials for their projects. The rapid emergence and evolution of the Internet has made it possible to share information about new technology and materials in a short amount of time. This allows designers to get a more precise and timely analysis of their proposals(Xiao, 2021).

In addition to being able to analyze the various aspects of the landscape, computer-aided design software can also help them create a more accurate and timely environmental simulation. One of the most common reasons why landscape designers use computer-aided design software is to visualize the effects of different materials on the environment. This allows them to avoid making costly mistakes and avoid repeating the design(Fan, 2022).

5 Computer-Aided Landscape Design's Means and Method

A computer is a basic device that converts digital information into physical form. It can perform various functions, such as calculating and processing data. The earliest applications of digital technology are in the design of aircraft and automobiles. With the ability to create a three-dimension model, designers can now take advantage of the computer's powerful simulation capabilities(Z. Li et al., 2018).

In the 1990s, computerization started to make its way into landscape design. It can assist in two main ways: first, it allows designers to create more accurate and timely environment simulations, and second, it allows them to perform various tasks that are usually carried out manually(Abdullah et al., 2015).

The following table summarizing the differences and comparisons of various computer-aided landscape design tools

Table 1the differences and comparisons of various computer-aided landscape design tools

Tool	Features	Benefits	Limitations
SketchUp	3D modeling, rendering, intuitive interface	Easy customization, realistic designs	Limited landscape-specific features
AutoCAD Architecture	Professional-grade, CAD, 3D modeling	Precise design, detailed architectural plans	Steeper learning curve, complex interface
Chief Architect	2D/3D floor plans, interior/exterior design	Comprehensive, realistic visualization	Advanced features may require training
Revit	Building Information Modeling (BIM)	Real-time collaboration, detailed 3D models	Requires proficiency in BIM methodologies
Home Designer Suite	User-friendly, floor plans, interior/exterior design	Easy customization, virtual walkthroughs	Limited advanced features

The table provided compares and contrasts various computer-aided landscape design tools. SketchUp and AutoCAD Architecture are both powerful tools that offer 3D modeling capabilities, with SketchUp being particularly well-suited for customization and AutoCAD Architecture offering more professional-grade features. However, SketchUp is limited in terms of landscape-specific features.

Chief Architect and Revit are both BIM tools that offer advanced 3D modeling capabilities and detailed visualization. While they offer comprehensive design options, they require proficiency in more complex methodologies and may have a steeper learning curve . while Home Designer Suite offers a user-friendly interface and basic design capabilities, making it ideal for those new to the field. However, it may be limited in terms of more advanced features.

It's important to evaluate each tool based on the specific requirements of the project and the user's individual preferences. Some users may prioritize ease-of-use and customization, while others may require more advanced features and precise design capabilities.

5.1 Digitization Blending into Analysis

One of the first major innovations in landscape design was digital bending analysis. This process allows designers to perform a more accurate and timely analysis of their projects(Qi, 2020). To The ability to create a three-dimensional model of a landscape is also beneficial for the quick analysis of the data. With the help of computer-aided design software, such as ARCGIS, Chief Architect, and 3D MAX, designers can now visualize the various aspects of the landscape(Zhang & Deng, 2022).

5.2 Digitization Blending into Representation

Besides these, other software such as SKETCHUP, 3D MAX, and MAYA can also help landscape designers to create a three-dimensional model. These tools can be used together with post-rendering software, such as Artlantis R(Haque et al., 2019).

Before, landscape designers had to hand-draw every aspect of a project. This method was very time-consuming and uncomfortable to modify. With the help of computer-aided design software, designers can now create a more accurate and timely layout plan. After the design is complete, some vector software such as CORELDRAW W and ILLUSTRATOR can help the designer express their ideas(Yang, 2021).

6 On the Influence of Cad on Landscape Design

This article aims to provide an overview of the various factors that affect the landscape design process, such as the relationship between technology and traditional painting techniques. It also explores how computer technology can potentially replace landscape designers(D. H. Li et al., 2016).

Even though computer-aided design software has helped landscape designers create more accurate and timely layouts, they still retain the traditional hand-drawn style. They can also use the software's accuracy and manual painting techniques to seek new ways of designing landscapes. One of the main advantages of computer-aided design software is its ability to provide landscape designers with a convenient and accurate method of creating their layouts(Luo, 2021).

In spite of how computer-aided design software has helped landscape designers create more accurate and timely layouts, they still retain the traditional hand-drawn style. This is because the concept of design is not a control tool. Instead, it allows the designer to manipulate the various features of the software to express their ideas. With the help of the software, the designer can now create a more convenient and accurate way to express their ideas(Tian, 2022).

7. Classification criteria for assistance programs in landscape design

7.1 The price of programs

The prices of programs are also compared based on their availability and the extent to which they can be acquired from the market(Xu & Wang, 2022).

7.2 Two-dimensional design

Some programs allow the creation of two-dimensional designs and the possibility of saving or modifying them. Others allow the import of two-dimensional images(Da-Hong et al., 2020).

7.3 Printing

One of the most critical criteria that landscape programs should have in order to provide effective and efficient services is the ability to print. This is because it allows the owner or customer to receive the output(Deng & Zhou, 2022).

7.4 Integration with other architectural programs

A landscape program can also convert files between formats. For instance, it can allow the creation of a composite design using the built-in features of AutoCAD(Theidel, 2021).

7.5 Lighting

One of the most critical factors that landscape programs should consider when it comes to designing a product is the lighting. With the ability to add effects of both artificial and natural lighting, it can give a more realistic and accurate impression of the product(Y. Liu & Xu, 2021).

7.6 Study the impact of lighting on the plants' growth

Through a landscape program, we can study the lighting in different areas and control its location. It can also study the effects of secondary lighting in landscape design. This helps us in properly placing plants(Cheng et al., 2020).

7.7Appropriate blooming sites

A landscape program can also create special maps showing the various types of flowers and plants that will bloom in different regions. This helps us in planning the site's design(Huang, 2017).

7.8 Trees and botanical library

A botanical library or trees and botanical library can provide an extensive selection of different tree species and sizes. It can help us choose the appropriate tree for the site(Z. Li, 2020).

7.9 Plant growth simulation

The study of various aspects of a project, such as the size, growth, and blooming seasons, can be carried out through a landscape program. It can also analyze the changes in the plants' size, form, and height with time(Y. Liu & Xu, 2021).

7.10 Land topography

The evaluation of landscape programs involves the calculation of the various factors that affect a site's development, such as its type of soil, groundwater, and rises and falls. Some programs, such as those used by Better Homes and Gardens, were not ideal for handling complex terrains(Jia, 2022).

The following table provides a comprehensive overview of the classification criteria for assistance programs in landscape design. It covers various important aspects that designers and professionals consider when choosing software for their projects.

The inclusion of criteria such as price, two-dimensional design capabilities, printing functionality, and integration with other architectural programs highlights the practical and technical considerations that impact the selection process. These criteria address the accessibility, flexibility, and compatibility of the software with existing workflows.

The criteria related to lighting, impact on plant growth, blooming sites, trees and botanical library, plant growth simulation, and land topography demonstrate the specialized features that landscape designers seek in software. These criteria cater to the specific needs of landscape design, enabling designers to create realistic, functional, and visually appealing outdoor spaces.

The table provides a clear and organized presentation of the classification criteria, making it easier for professionals to compare and evaluate different assistance programs. By considering these criteria, designers can make informed decisions based on the specific requirements of their projects.

However, it's important to note that individual preferences and project-specific needs may vary, and not all criteria may be equally relevant in every situation. Designers should carefully assess their own priorities and consider additional factors that are specific to their unique projects when choosing an assistance program for landscape design.

Table 2 the classification criteria for assistance programs in landscape design:

Classification Criteria	Description
Price	The cost of the program and its availability in the market.
Two-dimensional design	Whether the program allows the creation and modification of two-dimensional designs, or the import of two-dimensional images.
Printing	The ability of the program to generate printable outputs, allowing the owner or customer to receive physical copies of the design.
Integration with other architectural programs	Whether the program can seamlessly work with other architectural software, facilitating the exchange of files and data.
Lighting	The program's capability to incorporate and manipulate artificial and natural lighting effects, enabling designers to create realistic and accurate representations of the design.
Study the impact of lighting on plant growth	Whether the program can analyze and simulate the impact of lighting on plant growth, assisting designers in making informed decisions regarding lighting placement for optimal plant development.
Appropriate blooming sites	The program's ability to generate maps or visualizations indicating suitable locations for different types of flowers and plants to bloom, aiding in the planning and design of the site.
Trees and botanical library	Whether the program provides a comprehensive library of tree species and botanical information, allowing designers to select and incorporate suitable trees into their landscape designs.
Plant growth simulation	The program's capacity to simulate and analyze various aspects of plant growth, such as size, form, and blooming seasons, enabling designers to visualize and plan for the development of plants over time.
Land topography	The program's capability to evaluate and incorporate factors related to land topography, such as soil type, groundwater, and elevation changes, to inform the design and development of the landscape project.

Conclusions

Computers Aided Design Software For Landscape Designers provides landscape designers with an easier and more accurate method of creating layouts. It eliminates the need for manual labor and helps them focus on their main task, which is the standardization of work. The use of computer software for the design of landscape projects is a common process in this field. It is categorized into two categories: "CAD" software and "urban design software." These latter provide designers with the necessary resources and tools to produce urban designs, and they do not affect the other aspects of a project. This paper will provide an analysis of the most commonly used programs in this domain.

The goal of this project is to educate the landscape community about the proper use of computer-aided design software. This will help them make informed decisions when it comes to their projects. It will also make their design process more streamlined. It is designed to help landscape designers exhibit their ideas about the use of technology in their work. It will promote the profession's development and encourage new opportunities for practitioners.

In conclusion, this theoretical comparative review has provided valuable insights into various computer-aided landscape design tools. By analyzing the features, benefits, and limitations of these tools, we have gained a deeper understanding of their capabilities and suitability for different design requirements.SketchUp offers intuitive 3D modeling and rendering capabilities, allowing for easy customization and realistic designs. However, it may lack specific landscape design features. AutoCAD Architecture provides professional-grade CAD and 3D modeling, enabling precise and detailed architectural plans. Yet, its complex interface and steeper learning curve can be challenging for some users.Chief Architect offers comprehensive 2D/3D floor plans and interior/exterior design features, providing realistic visualizations. However, advanced features may require additional training. Revit, with its Building Information Modeling (BIM) capabilities, allows for real-time collaboration and detailed 3D models, but proficiency in BIM methodologies is required.

Home Designer Suite stands out for its user-friendly interface, floor plan creation, and virtual walkthroughs, although it may lack advanced features for experienced users. Considering the classification criteria, it is important to note that the price of the programs varies, and the availability in the market should be taken into account when selecting a tool. Additionally, two-dimensional design capabilities, printing functionality, integration with other architectural programs, lighting effects, study of lighting impact on plant growth, appropriate blooming sites,

trees and botanical library, plant growth simulation, and land topography are crucial factors to consider when choosing an assistance program in landscape design.

By examining these tools and criteria, professionals in the field of landscape design can make informed decisions and select the most suitable software for their specific project needs. It is essential to consider the individual requirements, preferences, and limitations of each tool when making the final decision.This study contributes to advancing the knowledge and understanding of computer-aided landscape design tools, promoting more efficient, sustainable, and user-friendly practices in the field. Future research can focus on exploring emerging technologies and their impact on landscape design, further expanding the range of tools and possibilities available to landscape professionals.

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