education sciences

Review

What's the Difference? A Comparison of Student-Centered Teaching Methods

Joshua R. Goodwin

Department of Curriculum and Instruction, College of Education, Purdue University, West Lafayette, IN 47907, USA; goodwin3@purdue.edu

Abstract: Many approaches to teaching and learning are classified as student-centered. The current literature evaluates these methods in-depth either individually or by comparing two or three at a time. This article provides a comparison of multiple student-centered teaching methods, with examples, employed in contemporary education. The aim is to assess the key characteristics associated with different approaches by investigating five popular student-centered teaching methodologies: activity-based learning, inquiry-based learning, cooperative learning, problem-based learning, and project-based learning. The results enable educators to make informed decisions about instructional strategies and provide a stepping stone for further research.

Keywords: student-centered teaching; pedagogy; problem-based learning; project-based learning; cooperative learning; situated learning; inquiry-based learning

check for updates

Citation: Goodwin, J.R. What's the Difference? A Comparison of Student-Centered Teaching Methods. *Educ. Sci.* **2024**, *14*, 736. https://doi.org/10.3390/educsci14070736

Academic Editors: Mi Yeon Lee and Jean S. Lee

Received: 11 April 2024
Revised: 2 July 2024
Accepted: 3 July 2024
Published: 5 July 2024

Copyright: © 2024 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

There has been a significant shift in educational paradigms in recent decades, with a growing emphasis on student-centered teaching methods (SCTs). Traditional teacher-centric approaches, where the instructor plays a central role in knowledge dissemination, have been challenged by the recognition that students are active participants in their own learning process [1–3]. SCTs prioritize student engagement, autonomy, and critical thinking, fostering a deeper understanding of concepts and enhancing the overall learning outcomes. Most teaching strategies can be placed into one of two categories: teacher-centered [2,4] or student-centered [1,3,5]. Though many definitions exist for both, for the purposes of this paper, I will rely on the following definitions to distinguish the two strategies: student-centered learning is "an instructional approach in which students influence the content, activities, materials, and pace of learning" [5] (pp. 338–339); teacher-centered learning is "an instructional approach in which the teacher controls the content, the activities, the materials, and the pace of learning" [5] (p. 349). Teacher-centered learning is often also referred to as a "traditional learning model" and is characterized by generally seeing students as passive learners rather than active learners in terms of engagement and motivation [5].

When investigating these two strategies in more detail, an array of styles and strategies that teachers and researchers use are found to have been developed with a focus on different aspects of a specific style. There are many names given to various SCT instructional methods. Some are quite similar to other SCTs but with different names, such as personalized learning and individualized learning. Some methods are technically different but can be difficult to differentiate between because they share similar definitions or assumed preconceived understanding. For example, when researching project-based learning and problem-based learning, one may find that both have a general definition of a student-centered approach to classroom instruction that involves students working collaboratively on solutions to authentic problems [6–9]. The difference between the two actually lies in the nuance and implementation, not only their definitions, which will be discussed below.

Based on this, we can see why it would be difficult for someone exploring the use of SCTs to understand the differences among them. It becomes even more difficult to decide which of these methods to use for your classroom. This is where further clarification on the differences between many of these methods is needed. The purpose of this article is to provide a brief comparison of five different SCTs employed in education: activity-based learning, inquiry-based learning, cooperative learning, problem-based learning, and project-based learning. By examining the definitions and key characteristics of each approach, I provide educators with an introduction to these SCTs to gain valuable insights into their suitability for different learning contexts and classroom use.

2. Background on Student-Centered Teaching

The theoretical roots of SCTs can be traced back to early American educational theory from John Dewey in the early 1900s. Dewey was a major proponent of experiential learning. His writings highlighted the importance of experience, engagement, social interaction, and authentic situational learning contexts for students. Building on Dewey's work, theorists like Vygotsky and Piaget worked towards explaining how children learn through experience and internalizing knowledge. Vygotsky [10] shared his belief of social interaction as a key component of learning and built upon Dewey's work from a psychological perspective. Piaget [11] built upon Dewey's work from a cognitive development perspective, providing a theoretical foundation for how learning takes place throughout childhood. These three seminal theorists' writings are essential to the foundation for constructivism, which is the epistemological foundation of many popular student-centered methods.

Constructivist work has been expanded upon since that time, notably by Bruner with the expansion of scaffolding in discovery learning [12,13], Lave and Wenger with the introduction of situated learning [14] and communities of practice [15], and others (e.g., [16–18]). These works further add to the understanding of how people learn and students develop knowledge. Collectively, their works led to methods of instruction in which the teacher and student dynamic is more fluid, and the students' learning is conceptualized as building new knowledge upon prior knowledge. They advocated for a view of teachers as being facilitators of students' knowledge construction more so than being distributors of knowledge [19].

On the one hand, advancements in understanding how children learn have influenced methods of instruction. Several strands of constructivism have been developed as a result of further research into how students learn. These strands have been taken up in classrooms and used to develop new methods of teaching. Such theories and methods include Vygotskian [10] social constructivism as seen in problem-based learning [8] and collaborative learning [20] with the characteristic of requiring group work and student interaction, Bruner's [12,13] guided discovery as seen in inquiry-based learning [21] with the characteristics of exploration and retesting hypotheses, and Papert and Harel's [22] constructionism as seen in project-based learning [7] with its characteristic of producing a tangible product. Studies have shown that, by having the student be the focus of the lessons rather than the teacher, children gain an increase in motivation, a deeper understanding of the content, a greater connection of the material to authentic situations, and improved test scores [6,7,23].

On the other hand, learning theories such as behaviorism and cognitivism do not provide a model of learning consistent with SCTs. Ertmer and Newby [24] alluded to this in their discussion on these learning theories alongside constructivism. According to them, the goal of behaviorism is to "focus on the importance of consequences" (p. 55), and correct responses are positively reinforced to ensure repetition in the future. From an instructional viewpoint, the student is responding to environmental stimuli rather than assuming an "active role in discovering the environment" (p. 55). The cognitivist perspective of learning focuses more on the organization of mental structures and how new information is stored and retrieved in a student's memory. They explain that cognitivist instructional methods "emphasize the role that environmental conditions play in facilitating learning [using methods such as] explanations, demonstrations, illustrative examples and matched non-examples" (p. 58). In this theory, the student plays a more active role in the learning process but only in the "mental activities of the learner that lead up to a response" (p. 59, italics in original), much like in that of behaviorism. Constructivism, according to these authors, views learning not as a transfer from the world into students' minds but, rather, "they build personal interpretations of the world based on individual experiences and interactions" (p. 63). Here, we see that students are creating and building an understanding within themselves as a result of interacting with the world around them. Ertmer and Newby [24] explained with these three theories, from an instructional perspective, that,

> As one moves along the behaviorist–cognitivist–constructivist continuum, the focus of instruction shifts from teaching to learning, from the passive transfer of facts and routines to the active application of ideas to problems. Both cognitivist and constructivist view the learner as being actively involved in the learning process, yet the constructivists look as the learner as more than just and active processor of information; the learner elaborates upon and interprets the given information (p. 66).

Understanding now how the various strands of constructivism provide the theoretical underpinning of SCTs, also referred to as student-centered learning, we can move toward a definition of what SCTs are and why we should work toward a better understanding of them. SCTs are instructional methods that shift the focus of the learning process from the teacher to the students [5]. For SCTs, the instruction, planning, decision-making, content, activities, pace of learning, etc. are all influenced more by concerns about student learning than concerns about the teacher's specific mode of knowledge transmission. When teachers adopt a student-centered approach, course material, activities, resources, and speed of instruction are more tailored to students' strengths, background knowledge, and social context, and in some cases, students can have more direct control over them as well. Students also have more opportunities to learn on their own and from one another while the instructor helps them develop the skills they need to do so [5]. Using SCTs, teachers take on the role of a facilitator of students' knowledge construction instead of a knowledge disseminator.

The definition of SCT has shifted and changed over time as researchers and teachers have taken ownership of its meaning, leading to a somewhat convoluted understanding of the term. O'Neill and McMahon [3] illustrated how the term SCT has become a complex term with varying definitions and conceptualizations. In their literature review, they described several different interpretations of the term and offered a consensus stating:

> In summary, it appears from the literature that some view student-centered learning as the concept of the student's choice in their education; others see it as the being about the student doing more than the lecturer (active versus passive learning); while others have a much broader definition which includes both of these concepts but, in addition, describes the shift in the power relationship between the student and the teacher (p. 32).

A common misconception is that there is no room for teacher-led instruction and didactic approaches within SCT. However, teacher-led and/or didactic approaches could occur within a SCT-based lesson when a teacher provides prerequisite knowledge or a foundational vocabulary before the student exploration of a new project-focused inquiry. For example, in a math lesson on graphing, the students may need to understand what a coordinate system is and what ordered pairs are by name before exploring how they work on the rate of change, velocity, and position of vehicles on a nearby road, leading to a larger investigation into their uses. By our definitions, this example has some teacher-led portions; however, they are not the primary means of learning but rather a means to begin the students' learning process and, thus, are still student-centered.

In the last century, SCTs have taken on many different forms and have been called by many different names. Larmer [9], for example, established a working list of over 100 SCT methods that included names like land-based learning, passion learning, and even zombie-based learning. Below, I share a comparative analysis and provide educators with insights into some of the most popular approaches available. This comparison can serve as a launching point for further research and investigations and an introductory reference piece for those interested in SCT.

3. Comparing Five SCT Instructional Methods

For this comparison, I evaluated online teaching resources to identify what appeared to be the most commonly discussed or used SCT methods. The sources (e.g., [25–30]) used to locate common methods were based on my experience as a teacher and coaching other teachers in developing instructional materials. The five methods identified were (a) activity-based learning, (b) collaborative learning, (c) inquiry-based learning, (d) problem-based learning, and (e) project-based learning. I then reviewed the relevant literature for each to establish a definition and list out the key characteristics of the method. These methods selected for comparison lay the groundwork for what SCTs are and what they can become. The aim of this article is to provide an overview of what they are and how they can be implemented more so than to delve into the history or theory behind these methods. This serves as a valuable resource for teachers seeking to implement SCT instructional strategies that align with their specific educational context and goals.

For each SCT, I provide a definition, key characteristics of the method as found in the literature, an example, and its relevance to teaching, meaning how the example is representative of the chosen method. The key characteristics are in no particular order of importance, and the examples provided are based on the associated definitions. Because of open sourcing, mislabeling of ideas, and perhaps a lack of universally accepted definitions, projects, materials, and information specific to each method can be difficult to find. For some of the examples provided, educators may interpret them differently from the way they have been labeled. Such divergence is welcome, as the purpose of this article is not to correct or challenge others' perspectives. Not every definition is understood in the exact same way by all scholars, as demonstrated previously by O'Neill and McMahon [3]. The premise of this article is not rigidity but in advocating for the principles of SCTs. Each method and example listed below has flexibility, allowing for manipulation, alteration, and use in various contexts.

3.1. Activity-Based Learning

3.1.1. Definition

Activity-based learning is an educational approach consisting of tasks, situations, and other short interactive exercises developed to guide children in learning. These tasks may be completed individually or in small groups and should include some instructor-led sections and allow students to respond and process new information. Prior knowledge is acquired, understood, and applied to new information and skills as the lessons continue [31,32].

3.1.2. Key Characteristics

The main characteristics of activity-based learning, in no particular order, are that it (a) uses activities to construct new knowledge, (b) employs a high level of student investment, (c) requires student exploration, (d) may be performed individually or as a group, and (e) involves activities that are either teacher-focused (more structured) or student-focused (less structured) [31,32]. The main component of this method is the use of activities as described above. Many SCTs incorporate activities to enhance or guide student learning, but in this method, the activities are the crux of the learning. The activities need to be shorter in length and scale than all-encompassing projects or week-long problems. They should be designed to encourage full student engagement, leading to a desire to explore further. Teacher-led sections help fill in the gaps during the activities or facilitate reflection afterward.

3.1.3. Example

One example of an activity-based learning task is Pizza Fractions (adapted from [25]) for recommended grades 2–5. In this activity, students create a pizza using classroom materials such as colored pencils, cardboard, construction paper, and manipulatives. Students create the toppings separately and then use them to decorate a certain fraction of the pizza. For example, if the teacher asks for one-fourth, the student will cover one-quarter of the pizza in mushrooms or pepperonis. This can be extrapolated to the students developing their own fractions, multiple fractions simultaneously, and fraction addition and subtraction. Teachers can visit http://mathseeds.com (accessed on 11 May 2024) for more examples of activity-based learning and other lessons.

3.1.4. Relevance to Teaching

Pizza Fractions is an example of activity-based learning, as it fits the key characteristics, definition, and is not better represented by another SCT. This example uses a short activity in which students are engaged with the material because of its familiarity and hands-on approach. It provides students with a visual and manipulative representation of fractions, which can be difficult for children to grasp. It provides teachers with an avenue for inserting students' voice and choice, as well as entry points for teacher-led sections where new information can be developed, challenged, and applied [25,31,32].

3.2. Collaborative Learning

3.2.1. Definition

In the original collaborative learning model developed by Reid et al. [33], there are "five phases for designing instruction for collaborative learning: engagement, exploration, transformation, presentation, and reflection" (p. 40). This has changed over time as the term cooperative learning has been developed, separating out key aspects between collaborative and cooperative learning practices. A recent definition of collaborative learning is that it is an educational approach to teaching and learning that involves groups of learners working together who are "challenged both socially and emotionally as they listen to different perspectives and are required to articulate and defend their ideas" [20] (p. 491) to solve a problem, complete a task, or create a product.

The main differences between collaborative and cooperative are (1) collaborative learning has a "focus on learners promoting shared responsibility for the goals, work, and other aspects of the assignments" [34] (n.p.), and (2) cooperative learning is focused more on teacher-led activities where "students work in groups to accomplish a common yet, pre-defined goal within specific planning by the instructor or teacher. Compared to the collaborative approach, the teacher has a greater role in affecting task distribution, differentiation of goals, and student input in collaborative learning" [34] (n.p.). Barkley, Cross, & Major [35] described the difference between these two SCTs as opposite ends of a continuum, sharing "Collaborative and cooperative learning [are] positioned on a continuum from most structured (cooperative) to least structured (collaborative)" (pp. 5–6).

3.2.2. Key Characteristics

The main characteristics of collaborative learning are that it is used to (a) promote positive interdependence, (b) employ a high level of student investment, (c) involve student presentations, (d) use collaborative group work, and (e) use activities and lessons that are either teacher-focused (cooperative learning) or student-focused (collaborative learning) [20,25,33,36]. The main component of this method is learning with peer collaboration. Many SCTs can incorporate the element of collaboration to enhance or guide student learning, but in this method, collaboration is the crux of the learning. Collaboration among students working on open-ended activities or lessons is the foundation of collaborative learning, while students working together on teacher-led, more structured activities or lessons is the foundation of cooperative learning. Here, we see the nuance of SCTs' definitions coming into play. In collaborative learning, students should be grouped together in a way that promotes individual strengths within the group. The lessons and activities do not have a set length but do require some form of presentation from the groups at the end. This could be as formal as a slide show or speech or as simple as discussing ideas from their seats.

3.2.3. Example: Collaborative Learning

An example for this SCT is Case Study [26] for recommended grades 6–12, where the instructor creates four to five case studies or problems of similar difficulty. These studies can vary depending on the subject. For example, different poems in a literature class or personal interviews in a sociology class. Students work in groups, typically from three to five, to work through and analyze their tasks. The roles in these groups are decided by the students, along with solutions and outcomes of the case study or problem. Teachers may answer questions and prompt/posit questions as necessary but not take away from the students' investigations. Groups present their analyses to the class, allowing time for other students to ask questions and learn from each other. Teachers can visit http://teaching.cornell.edu/resource (accessed on 11 May 2024) for more examples of collaborative learning and other lessons.

3.2.4. Example: Cooperative Learning

One example of cooperative learning is using Think-Pair-Share [27] for recommended grades 2–12. In a math lesson that requires a nonspecific answer, such as estimation or logic, students are presented with a task or problem. First, students think individually about an answer to the problem, knowing they will have to share it with a group. This inspires in-depth thinking and motivation. Next, they share their ideas with a partner or small group, practicing listening for understanding and communication skills. Lastly, they share their group solution with the whole class or larger group. Teachers can visit http://www.teachervision.com (accessed on 11 May 2024) for more examples of cooperative learning and other lessons.

3.2.5. Relevance to Teaching

By using case studies and think-pair-share as examples, it is easier to see the difference between these two SCTs. Case studies allow the teacher to utilize a more open-ended approach to learning, whereas this version of think-pair-share promotes more structured and rigid work on the part of the student. Both examples require students to use their personal strengths in a group setting by allowing them to share their ideas and perspectives while also listening and responding to others. Each example can require students to share perspectives and prior knowledge, enabling them to co-construct new knowledge alongside their peers. Whether sharing as a pair or a group, both versions require a form of presentation [26,27].

3.3. Inquiry-Based Learning

3.3.1. Definition

Lee et al. [21] defined inquiry-based learning as an "array of classroom practices that promote student learning through guided and, increasingly, independent investigation of complex questions and problems, often for which there is no single answer" (p. 9). Inquiry-based learning uses the scientific method to allow students to form, test, and retest hypotheses for solutions to the question. This can be performed individually or in groups, and there is significant emphasis on student exploration and engagement [37].

3.3.2. Key Characteristics

The main characteristics of inquiry-based learning are that it (a) begins with a driving question, (b) follows the scientific method of inquiry, (c) typically has preset steps, (d) requires students to practice hypothesis testing and retesting, (e) requires student exploration, (f) requires student reflection, and (g) may be performed individually or as a group [21,37]. Although many SCTs incorporate the idea of inquiry and exploration in the learning process, inquiry-based learning is specifically organized to follow the steps of the scientific method. Driving questions are used to build student engagement and motivation throughout the lesson. The lessons and activities do not have a set length but typically follow preset steps set up by the instructor. For example, in a traditional high school chemistry lab, the steps are laid out on a sheet of paper, and the students follow the instructions to find out what happens. This is where the hypothesis testing and retesting come in. Students should hypothesize about what will happen during the lesson. The hypothesis could be as simple as a given math problem simplifying to one or as complex as a guess towards what the net forces will be on a moving object. Student reflection is also a crucial piece, as it allows students to process their work, learning, and thoughts more deeply.

3.3.3. Example

An example of inquiry-based learning is The Boat Float [28] for recommended grades 4–12. The creators of this task describe it as:

> In this task, the teacher provides learners with basic information regarding the physics of floatation and buoyancy. They ask students to explore how boats the size of luxury cruise liners and container ships can stay afloat even with the extra weight and then have them use their knowledge to create a boat that can remain afloat in a plastic tub of water. They [students] should experiment with different types of materials and designs while following the scientific concepts they have learned. Once learners have found a way to keep their boat afloat, have them add items such as paperclips or thumbtacks to see if the weight causes their boat to sink. They can also simulate storms and ocean waves by causing disruptions to the water in the tank. Have them observe how the boats that successfully remain afloat also follow the requirements for buoyancy and how this allows shipbuilders to create boats of all sizes that will stay afloat in many different conditions (n.p.).

Teachers can visit https://futurefocusedlearning.net/blog/learner-agency/5-terrific-inquiry-based-learning-examples (accessed on 11 May 2024) for more examples of inquiry-based learning and other lessons.

3.3.4. Relevance to Teaching

This activity represents inquiry-based learning by providing a typical science experiment that allows students and teachers to follow all the characteristics described above. The driving question helps support engagement through the lesson. Hypothesis testing takes the form of asking and examining how boats float with added weight. Retesting occurs after adding weight and the boat sinks. Reflection can occur throughout or at the end from instructor prompting, reflection worksheets, or group discussions. What makes this an inquiry-based task rather than activity-based is the necessity for preset steps, using the scientific method, and the use of hypothesis testing and retesting [21,28,37].

3.4. Problem-Based Learning

3.4.1. Definition

Problem-based learning was originally developed in the medical field as a means of hands-on learning. Barrows and Tamblyn [38] described it as "a method of learning in which the learners first encounter a problem, followed by a systematic, student-centered inquiry process" (p. 1). Over time, it has been adapted to classroom use for student learning centering on solving a complex problem that can be approached through multiple methods and may have multiple ways of being answered. Students engage in the material and use newly constructed knowledge to aid in solving the problem. Students are encouraged to reflect on their solutions and processes. The teacher should act as a facilitator of activities, not a disseminator of knowledge [8].

3.4.2. Key Characteristics

The main characteristics of problem-based learning are (a) it begins with a driving question, (b) uses larger, open-ended problems to enhance or replace a lesson, (c) often employs the use of case studies or fictitious scenarios, (d) allows students to practice hypothesis testing, (e) requires student exploration, (f) requires student reflection, and (g) incorporates community partners for authenticity and application [8,9,39]. The focus of this SCT is on the method of solving a problem. Many SCTs can use problems in their lessons; the difference here is that the problem is the driving force behind the learning. Students construct knowledge through the exploration of solving the problem using hypothesis testing and preset steps; however, students should not be taught how and why the solutions work ahead of time. Rather, solutions are used for discussion and reflection to promote further growth in understanding.

3.4.3. Example

An example of a problem-based learning task is the Design a Food Truck problem for recommended grades 4–9 (adapted from [29]). For this problem, students are tasked with designing their own food truck for their community. Students research popular food truck options and operational costs. The problem of designing their own food truck has the potential of addressing many learning objectives, such as arithmetic, economics, entrepreneurship, vocabulary, reading, and more. Posing an open-ended problem such as this allows students to engage in the material and be invested as a result of students' voice and choice. Students can work individually or in groups to design their own menu and truck layout. Their solutions are presented by students in the form of crafts, pictures, graphics, models, etc. Grade-level appropriate adjustments can be made concerning budgeting and geographical considerations. Teachers can visit http://www.bctf.ca/classroom-resources (accessed on 11 May 2024) for more examples of problem-based learning and other lessons.

3.4.4. Relevance to Teaching

Some of the main deciding factors of problem-based learning are open-endedness, lesson replacement or enhancement, and authentic situations. Designing a food truck meets all three of these, as well as the characteristics described above. This example allows students to voice their ideas and choices in multiple aspects, including the type of food, menu, price, design, and more. With a hands-on approach, students can explore finance, math, art, and design. The fictitious scenario of creating a food truck is grounded in an authentic situation. Students can present their designs and plans at the end to the class, to another group at the school, or community partners. These partners can be local restaurateurs, other teachers, or simply volunteer parents to replicate the idea of a client meeting. Teacher-led learning sessions where new information is developed, challenged, and applied are still valuable, but the lesson should not dominate the class time [8,29].

3.5. Project-Based Learning

3.5.1. Definition

Project-based learning can be defined as a student-centered approach to teaching and learning that involves students working collaboratively on solutions to authentic problems [6,7]. These problems are grounded in real-world situations, and the solutions are presented via an artifact at the end of the project. These projects are typically larger in scope, replacing or enhancing entire units or curricula. Community partners are brought in to facilitate further investigation and realism of the projects. There are a few differences between project-based learning and problem-based learning, the biggest of which is size and scope. On the one hand, problem-based learning is typically completed in one to two classes and usually only involves one or two subjects. On the other hand, project-based learning takes weeks or months to complete and involves multiple subjects. Teachers and students working collaboratively on projects in this manner provide opportunities for cooperative engagement, real-world integration, and encourage intrinsic motivation [6,7,23].

3.5.2. Key Characteristics

The main characteristics of project-based learning are (a) it begins with a driving question, (b) uses larger, open-ended problems to enhance or replace a curriculum or unit, (c) requires students to use tools and technology, (d) requires student work and solutions to be presented at the end of the project to the class or community partners, and (e) incorporates community partners for authenticity and application [6,7,9,23]. Project-based learning often encompasses not only several problems and activities but may also include other SCTs. For example, in a project on building a scale model wooden bridge, inquiry-based learning may be used to investigate the strongest bridge designs, or activity-based learning could be used to investigate materials that will be used during construction. Project-based learning replacing or enhancing entire units or curricula allows the project to become a theme for other assignments and goals, creating unity across disciplines or areas of study [23]. For example, a project on tiny home construction could incorporate learning about vocabulary, reading, measurement, and arithmetic.

3.5.3. Example

An example of a project-based learning task recommended for grades 3–6 is a Design a Garden project, where students are tasked with designing a school garden for herbs and vegetables. This project starts with a driving question: How do we, as consumers and students, create a vegetable garden at school to help diversify food intake in an urban food desert? Students then need to research what it takes to build a garden, how much room the school has available, what costs are involved, and more. Community partners are brought in for demonstrations and examples. These partners could be local farmers or gardeners who can discuss growing and soil with the students or the principal of the school to discuss areas and planning. Teachers can visit http://my.pblworks.org (accessed on 11 May 2024) for more examples of problem-based learning and other lessons.

3.5.4. Relevance to Teaching

For this example, the task of designing a community garden can serve as the theme of an entire unit of learning. To use this in an elementary school, teachers could work with their administration ahead of time to put the final project into place and have students build the garden on school grounds. Students should be prepared to present their ideas formally to the administration directly. Tasks in this unit can be separated into several categories and include individual, group, and full-class activities. Reading and spelling time could focus on literature and vocabulary about growable foods and garden maintenance. Math time could be spent measuring possible areas, calculating area and volume, and creating a budget. Science and social studies could focus on researching local food systems, growers, and challenges to sustaining a garden in their area. Designing a garden meets all the characteristics of project-based learning. It provides ample room for student engagement, self-efficacy, teacher-led and student-led sections, and ownership of a real-world problem that students can solve in a hands-on manner and see their solution come to life in real time [6,7,9,23].

4. Looking across Five SCT Methods

For quick access to the practices each SCT is inherent to, and ease of understanding where the overlap occurs, Table 1 below contains all five SCTS and all of the key characteristics from Section 3. Each collum is labeled with the corresponding SCT, and each row lists out the prominent practices. An "X" has been placed in the corresponding square if the practice was found in the literature reviewed. From this table, teachers can readily seek out a practice they are interested in and see what corresponding SCT contains them or vice versa.

Table 1. Prominent practices that appear in 5 chosen SCTs.

	Project-Based	Problem-Based	Inquiry-Based	Activity-Based	Collaborative
Projects enhance or replace curriculum or units	X				
Uses tools and technology	X				
Open-ended tasks	X	X			
Authentic applications	X	X			
Community partners	X	X			
Collaboration	X	X			X
Student presentation	X				X
Embrace individual strengths in group settings					X
High level of student engagement	X			X	X
More teacher-focused activities				X	X
Uses activities to construct new knowledge				X	
Exploration			X	X	
May be performed individually			X	X	
Generally follows the scientific method			X		
Follows preset steps		X	X		
Hypothesis testing		X	X		
Reflection		X	X		
Begins with a driving question	X	X	X		
Problems enhance or replace lessons		X			
Uses case studies or fictitious scenarios		X			

It is worth noting that, while the focus of this article is on the comparison of SCTs, I recognize that no single approach is universally superior. All five of the methods presented can be utilized in k–12 classrooms of any subject or topic. The suitability of a specific method will depend on various contextual factors, such as the subject matter, student population, available resources, learning goals, and teacher personality. Therefore, this article provides an overview of these five different methods, allowing teachers to further their research and make more informed decisions based on their unique educational contexts.

5. Summary

Understanding the diverse range of SCTs is crucial for educators seeking to create engaging and effective learning environments. Teacher-centered lessons have a place and should not be omitted entirely, especially when helping students learn vocabulary, academic language, and other content-specific conventions. This article contributes to the ongoing discourse on SCT education and provides educators with valuable insights to enhance their instructional practices. The SCTs reviewed here, and many others that have not been discussed, have similarities, but each has their own unique characteristics that are not present in the others. There is not a single practice that all five of these SCTs share in common, and yet, the flexibility of each method allows teachers to include any practice into any other SCT. By examining the principles, characteristics, examples, and relevance of various approaches, educators can better equip their classrooms with multiple effective learning methods and opportunities for students to be active participants in learning.

Funding: This research received no external funding.

Acknowledgments: The author would like to thank Lane Bloome and Jean Lee for their guidance and unwavering support. Thank you.

Conflicts of Interest: The author declares no conflicts of interest.

References

1. Barr, R.B.; Tagg, J. From teaching to learning—A new paradigm for undergraduate education. *Change* **1995**, *27*, 12–25. [CrossRef]
2. Dole, S.; Bloom, L.; Kowalske, K. Transforming Pedagogy: Changing Perspectives from Teacher-Centered to Learner-Centered. *Interdiscip. J. Probl-Based Learn.* **2016**, *10*, 1. [CrossRef]
3. O'Neill, G.; McMahon, T. Student-centred learning: What does it mean for students and lecturers. In *Emerging Issues in the Practice of University Learning and Teaching I*; AISHE: Dublin, Ireland, 2005.
4. Peyton, J.K.; More, S.K.; Young, S. *Evidence-Based, Student Choice Instructional Practices*; Center for Applied Linguistic: Washington, DC, USA, 2010; pp. 20–25. Available online: http://cal.org/caelanetwork (accessed on 10 January 2024).
5. Collins, J.W.; O'Brien, N.P. (Eds.) *Greenwood Dictionary of Education*; Greenwood: Westport, CT, USA, 2003.
6. Bell, S. Project-based learning for the 21st century: Skills for the future. *Clear. House* **2010**, *83*, 39–43. [CrossRef]
7. Blumenfeld, P.C.; Soloway, E.; Marx, R.W.; Krajcik, J.S.; Guzdial, M.; Palincsar, A. Motivating project-based learning: Sustaining the doing, supporting the learning. *Educ. Psychol.* **1991**, *26*, 369–398. [CrossRef]
8. Hmelo-Silver, C.E. Problem-based learning: What and how do students learn? *Educ. Psychol. Rev.* **2004**, *16*, 235–266. [CrossRef]
9. Larmer, J. Project-Based Learning vs. Problem-Based Learning vs. X-BL. 13 July 2015. Available online: https://www.edutopia.org/blog/pbl-vs-pbl-vs-xbl-john-larmer (accessed on 12 December 2023).
10. Vygotsky, L. *Mind in Society*; Harvard University Press: London, UK, 1978.
11. Piaget, J. *Genetic Epistemology*; Columbia University Press: New York, NY, USA, 1970.
12. Bruner, J.S. *Toward a Theory of Instruction*; Belkapp Press: Cambridge, MA, USA, 1966.
13. Bruner, J.S. The Role of Dialogue in Language Acquisition. In *The Child's Concept of Language*; Sinclair, A., Jarvelle, R.J., Levelt, W.J.M., Eds.; Springer: New York, NY, USA, 1978.
14. Lave, J.; Wenger, E. *Situated Learning: Legitimate Peripheral Participation*; Cambridge University Press: Cambridge, UK, 1991.
15. Wenger, E. Communities of practice: Learning as a social system. *Syst. Think.* **1998**, *9*, 2–3. [CrossRef]
16. Von Glasersfeld, E. Cognition, construction of knowledge, and teaching. *Synthese* **1989**, *80*, 121–140. [CrossRef]
17. Leask, M.; Younie, S. Communal constructivist theory: Information and communications technology pedagogy and internationalisation of the curriculum. *J. Inf. Techology Teach. Educ.* **2001**, *10*, 117–134. [CrossRef]
18. Tall, D. *How Humans Learn to Think Mathematically: Exploring the Three Worlds of Mathematics*; Cambridge University Press: Cambridge, UK, 2013.
19. MacGregor, J. Collaborative learning: Shared inquiry as a process of reform. *New Dir. Teach. Learn.* **1990**, *42*, 19–30. [CrossRef]
20. Drew, C. Collaborative Learning: Pros & Cons. 10 May 2023. Available online: https://helpfulprofessor.com/collaborative-learning/ (accessed on 10 January 2024).
21. Lee, V.S.; Greene, D.B.; Odom, J.; Schechter, E.; Slatta, R.W. What is inquiry guided learning. In *Teaching and Learning through Inquiry: A Guidebook for Institutions and Instructors*; Lee, V.S., Ed.; Stylus Publishing: Sterling, VA, USA, 2004; pp. 3–15.
22. Papert, S.; Harel, I. Situating constructionism. *constructionism* **1991**, *36*, 1–11. Available online: https://pirun.ku.ac.th/~btun/papert/sitcons.pdf (accessed on 10 January 2024).
23. Kokotsaki, D.; Menzies, V.; Wiggins, A. Project-based learning: A review of the literature. *Improv. Sch.* **2016**, *19*, 267–277. [CrossRef]
24. Ertmer, P.A.; Newby, T.J. Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Perform. Improv. Q.* **1993**, *6*, 50–72. [CrossRef]
25. MathSeeds. 7 Classroom Math Activities That Will Make Math Engaging and Fun. Available online: https://mathseeds.com/articles/2018/02/26/classroom-math-activities/ (accessed on 11 May 2024).
26. Center for Teaching Innovation. Examples of Collaborative Learning or Group Work Activities. Available online: https://teaching.cornell.edu/resource/examples-collaborative-learning-or-group-work-activities (accessed on 11 May 2024).
27. Kaddoura, M. Think pair share: A teaching learning strategy to enhance students' critical thinking. *Educ. Res. Q.* **2013**, *36*, 3–24.
28. Future Focused Learning. 5 Terrific Inquiry-Based Learning Examples. Available online: https://futurefocusedlearning.net/blog/learner-agency/5-terrific-inquiry-based-learning-examples (accessed on 11 May 2024).
29. Aquino, P. Design a Food Truck. 2016. Available online: http://bctf.ca/classroom-resources/details/design-a-food-truck (accessed on 12 December 2023).
30. PBL Works. What Is PBL? Buck Institute for Education. 2019. Available online: http://my.pblworks.org (accessed on 10 January 2024).
31. Felder, R.M.; Brent, R. Active learning: An introduction. *ASQ High. Educ. Brief* **2009**, *2*, 1–5.
32. Geneva Global. Introduction to Activity-Based Learning. July 2021. Available online: https://www.genevaglobal.com/wp-content/uploads/2021/10/Activity-Based-Learning.GenevaGlobal.2021-07.pdf (accessed on 10 January 2024).
33. Reid, J.; Forrestal, P.; Cook, J. *Small Group Learning in the Classroom*; Heinemann: Portsmouth, NH, USA, 1989.

34. Gryshuk, R. Collaborative vs Cooperative Learning: Which Will Suit Your Course Best? *Collaborative Learning*, 14 June 2023. Available online: https://www.educate-me.co/blog/collaborative-vs-cooperative-learning (accessed on 10 January 2024).
35. Barkley, E.F.; Major, C.H.; Cross, K.P. *Collaborative Learning Techniques: A Handbook for College Faculty*; John Wiley & Sons: Hoboken, NJ, USA, 2014.
36. Laal, M.; Laal, M. Collaborative learning: What is it? *Procedia-Soc. Behav. Sci.* **2012**, *31*, 491–495. [CrossRef]
37. Pedaste, M.; Mäeots, M.; Siiman, L.A.; De Jong, T.; Van Riesen, S.A.; Kamp, E.T.; Manoli, C.C.; Zacharia, Z.C.; Tsourlidaki, E. Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educ. Res. Rev.* **2015**, *14*, 47–61. [CrossRef]
38. Barrows, H.S.; Tamblyn, R.M. *Problem-Based Learning: An Approach to Medical Education*; Springer Publishing Company: Berlin/Heidelberg, Germany, 1980; Volume 1.
39. Schwartz, P. *Problem-Based Learning*; Routledge: London, UK, 2013.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.