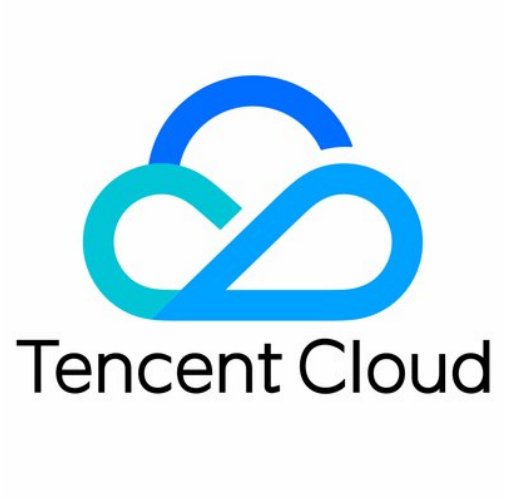
Low-code Interactive Classroom

Product Introduction

Product Documentation



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Product Introduction

Overview

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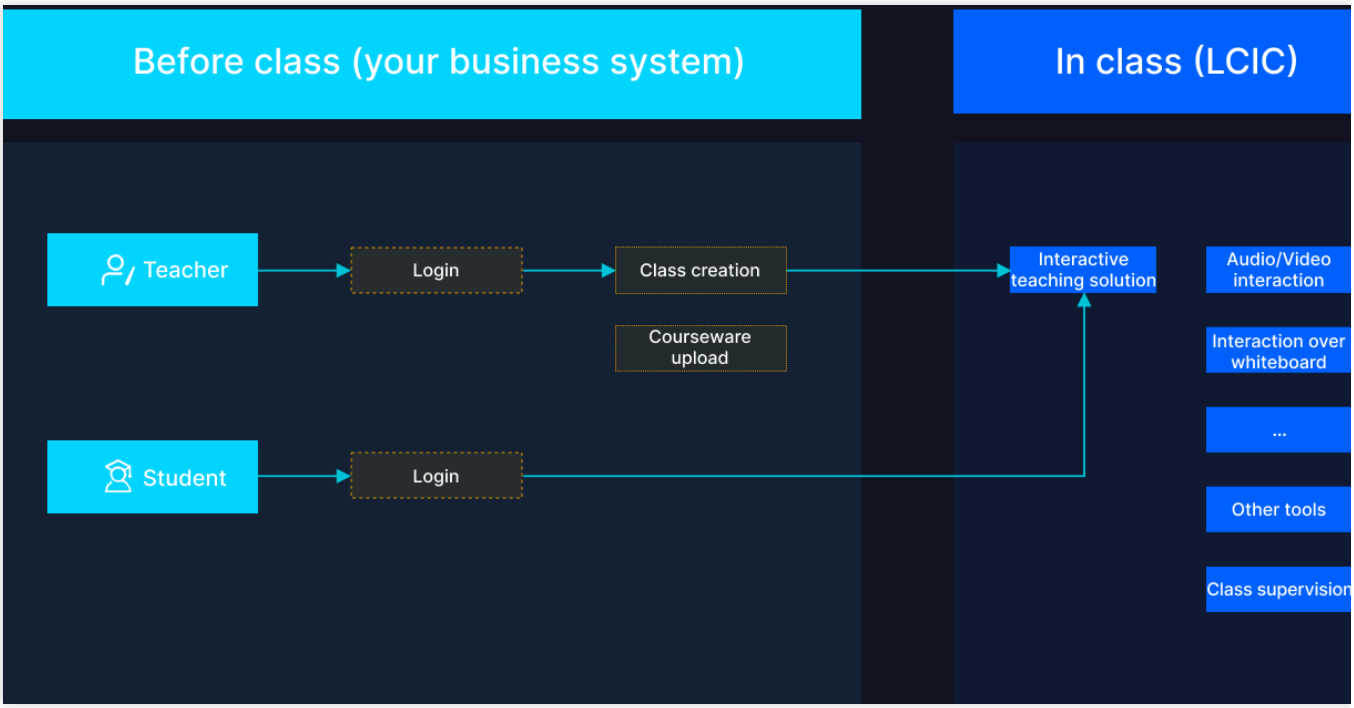
Overview

Low-Code Interactive Classroom (LCIC) is an aPaaS online class solution built on Tencent Cloud audio/video products. You can embed the LCIC SDK into your business system to build your own online interactive classroom, without the need to develop into the complex core logic of audio/video technologies, which greatly accelerates and simplifies development of your class application.

LCIC supports multiple class roles like teacher, teaching assistant, spectator, and student. It provides various features, including real-time audio/video interaction, real-time messaging, courseware document presentation, interactive whiteboard, real-time recording, screen sharing, and teaching components such as clicker, awards, and timer. It is suitable for many education types like higher education, vocational training, and K-12 and covers diverse teaching scenarios, including one-to-one, small, large, open/live, and dual-teacher classes, online art exam/art training, and online study room.

LCIC does not store your sensitive data, and it features high security and flexibility for different business scenarios. Simply select ports and features as needed to set up your own online class service. It offers a standard class UI in the form of the SDK, so you can call the UI in your business process as needed to start a class. After a class ends, you can use the API to retrieve the class data. LCIC supports custom UIs and components as well as flexible extension of features and seamless interconnection with your other systems (user system and class scheduling system).



LCIC offers APIs for interconnection of the class processes above. The APIs implement services such as class scheduling, user management, and class login authentication, involving class creation, courseware upload, login authentication, class video, class data acquisition, and class video acquisition and covering all API use cases before, during, and after the class.

Differences between aPaaS and PaaS education solutions

TRTC provides the aPaaS and PaaS solutions for LCIC, the differences of which are as listed below:

Type	aPaaS Education Solution	PaaS Education Solution
Overview	Uses TRTC LCIC to implement online interactive teaching scenarios.	Integrates TRTC, TIW, Chat, COS, CDN, and VOD to set up online interactive teaching scenarios.
Target customers	Suitable for customers who have only limited development resources, a tight schedule, and customization requirements and want to quickly launch their online interactive teaching application.	Suitable for customers who have ample development resources and high requirements for customization.
Development	Low	High

costs		
Time to launch	As low as 15 minutes	1–3 months
Implemented features	Provides real-time interactive class features, supports core features such as real-time audio/video, real-time messaging, interactive whiteboard, real-time recording, and screen sharing, and offers APIs for class and user management. Features can be flexibly extended to seamlessly interconnect with your user and class scheduling systems.	You need to implement features such as real-time audio/video, real-time messaging, and interactive whiteboard on your own.
Extensibility	High	Very high
Business data security	Doesn't store your business data.	Doesn't store your business data.
Frontend UI	Offers the default class UI, which is customizable.	You need to implement all UI on your own.
Platform	macOS Windows Web Android iOS Mini program	Supports over 20 platforms and frameworks.
Supported scenarios	Supports diverse teaching scenarios, including one-to-one, small, large, open/live, and dual-teacher classes, online art exam/art training, and online study room.	You need to define and implement any online interactive teaching scenarios on your own.

Class roles

LCIC supports the following roles:

Class Role	macOS	Windows	Web	iPad	Android Tablet	iOS	Android	Mini program	HTML 5
Teacher	✔	✔	✔	✔	✔	-	-	-	-
Student	✔	✔	✔	✔	✔	✔	✔	✔	-

Teaching assistant	✔	✔	✔	✔	✔	-	-	-	-
Spectator	✔	✔	✔	-	-	-	-	-	-

Use Cases

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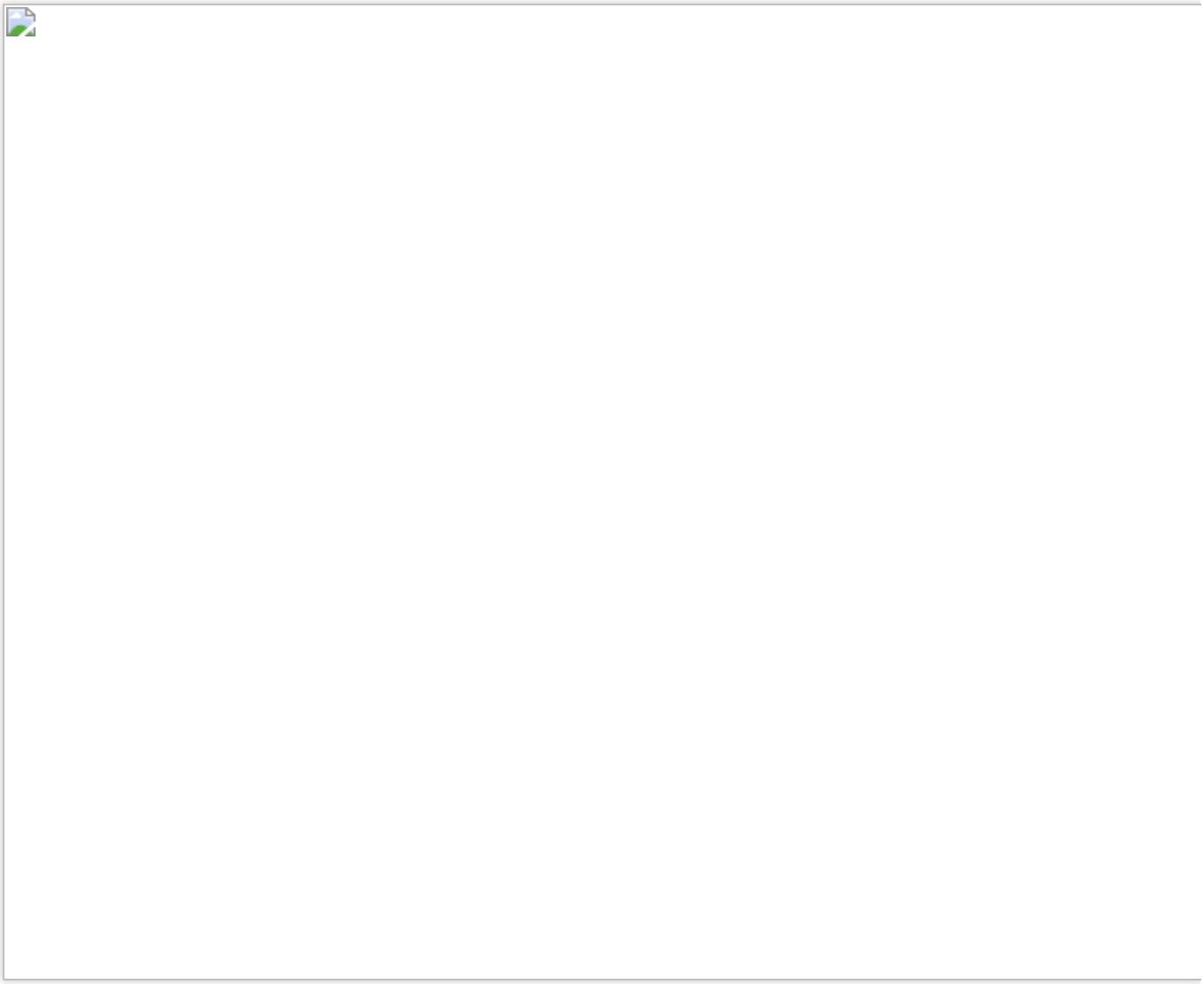
LCIC supports multiple class roles like teacher, teaching assistant, spectator, and student and provides various features, including real-time audio/video interaction, real-time messaging, courseware document presentation, interactive hiteboard, real-time recording, screen sharing, and teaching components such as clicker, awards, and timer. It covers diverse teaching scenarios, including one-to-one, small, large, open/live, and dual-teacher classes, online art exam/art training, and online study room.

Vocational education

LCIC allows the teacher to conduct classes through live streaming and screen sharing and allows students to interact with the teacher in various ways such as text and images, hand raising and speaking, and real-time interaction.
It supports diverse capabilities such as real-time audio/video interaction and low-latency live streaming for vocational education scenarios.
It offers multiple interaction capabilities such as interactive whiteboard, courseware sharing, graffiti, and screen sharing.
It allows the teacher to supervise students in real time and provide timely assistance.



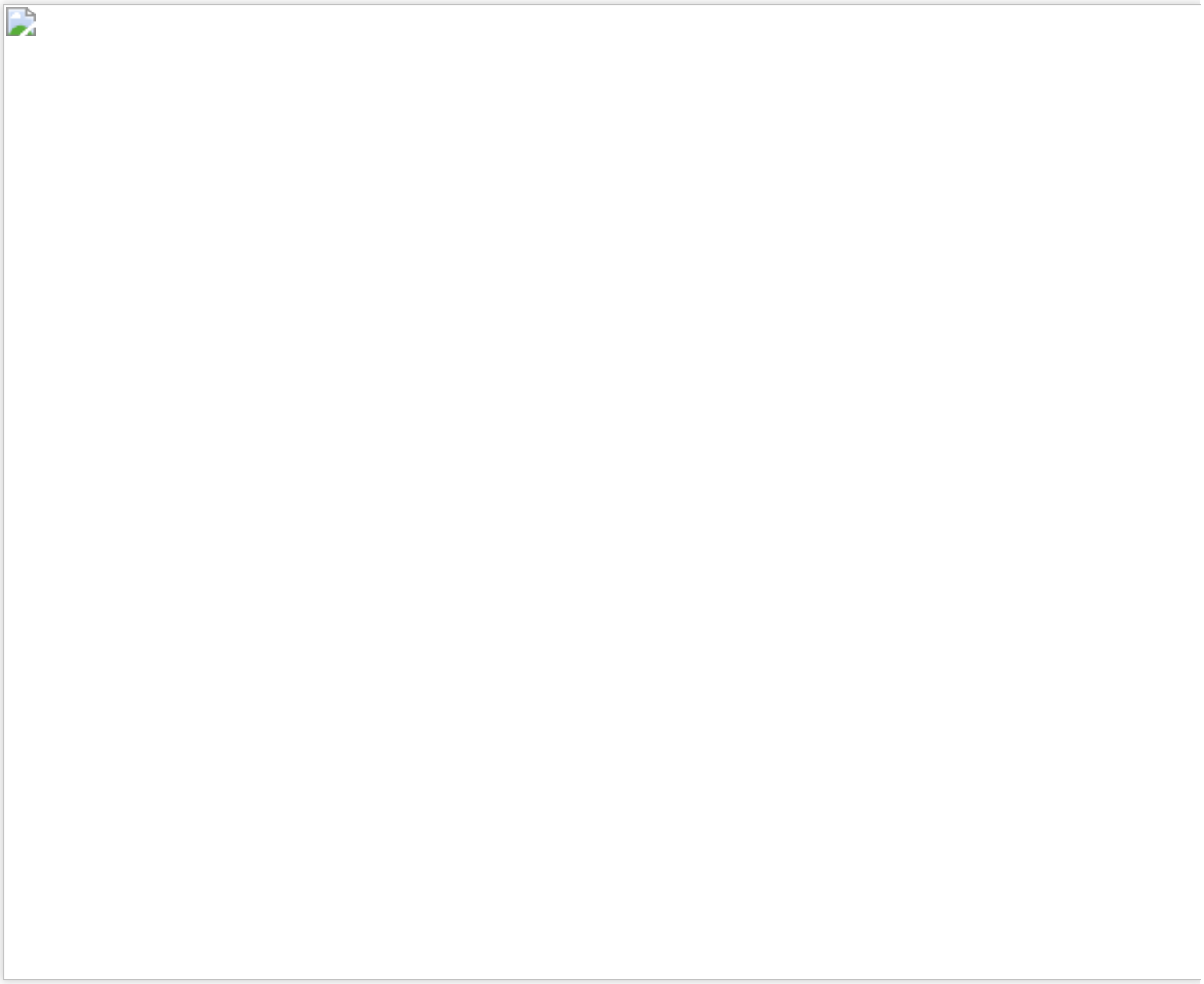
Language teaching

LCIC enables the teacher to teach language classes online and leverages capabilities such as ultra low-latency interaction, sound quality optimization, and HD camera connection to help the teacher promptly correct students' mouth shape and pronunciation mistakes.

It supports multiple class types such as one-to-one and one-to-many.

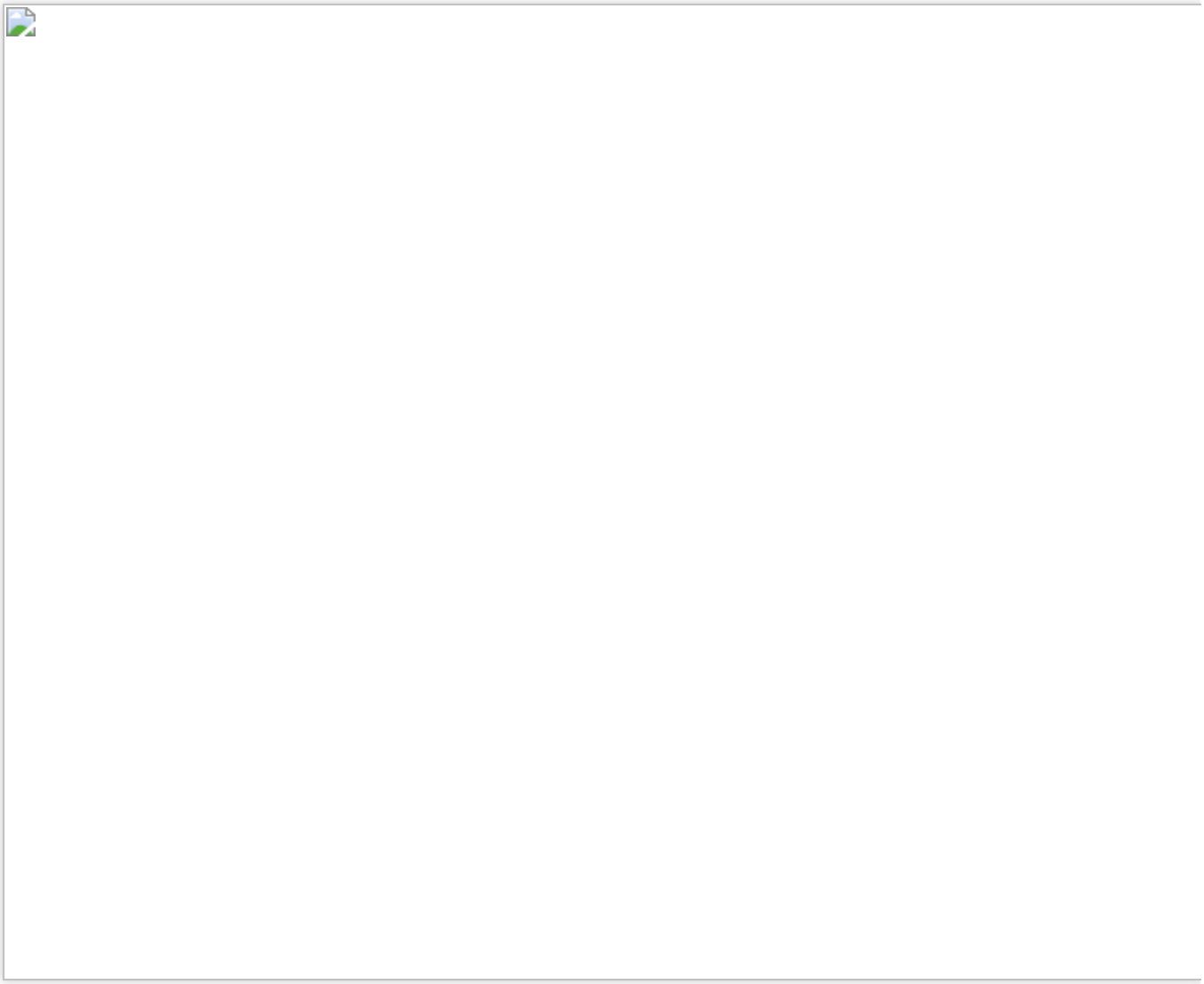
It supports sound quality optimization, noise cancellation, and HD camera connection.

It allows the entire lecture to be recorded and then played back on demand later, helping students go over the lecture to enhance the learning results.



Art training

LCIC allows professional music teachers to teach music, train students, and test them online with high sound quality.
It supports high sound quality mode for music training.
It supports audio mix for multiple sound cards, making music training more professional.

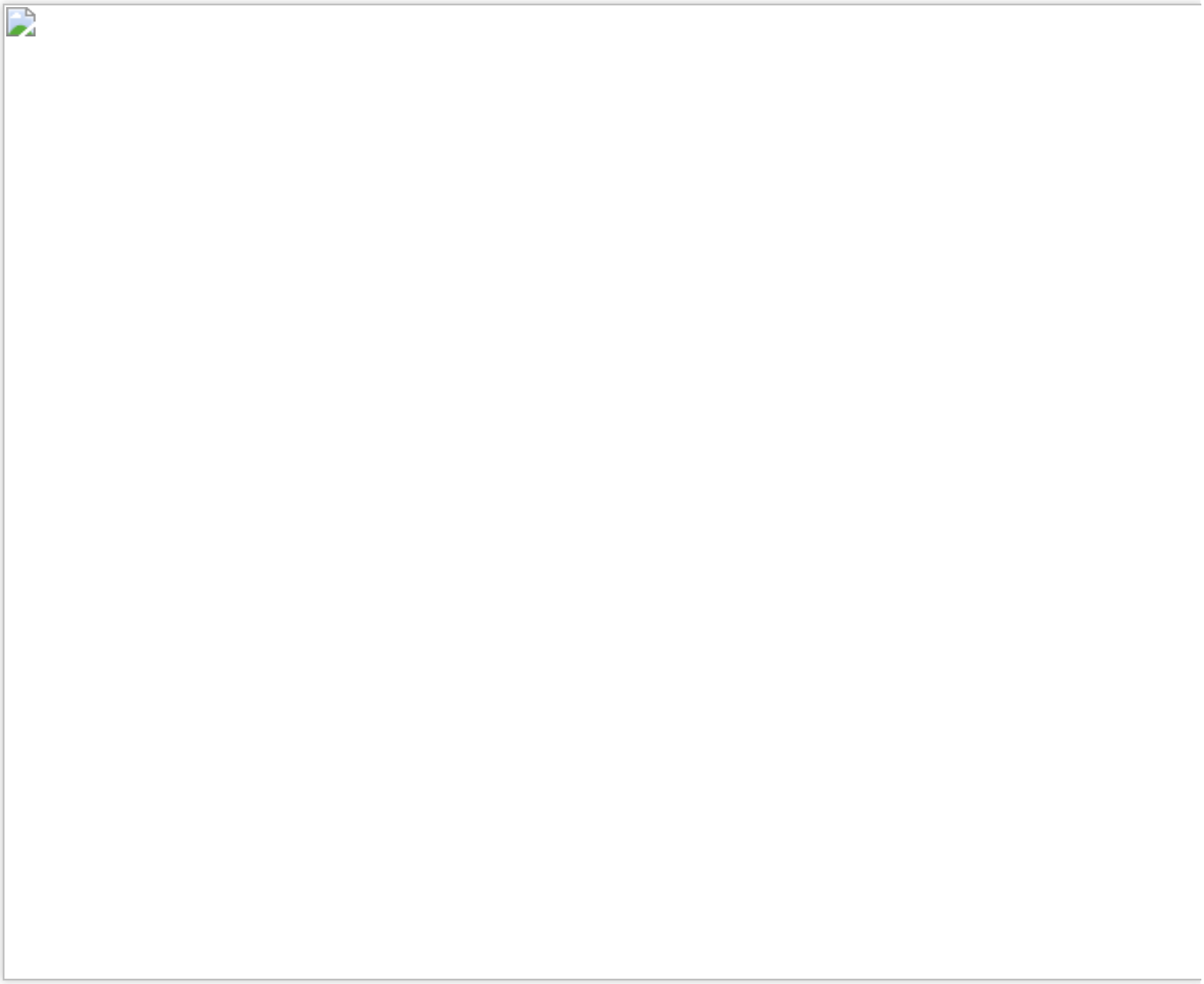


One-to-one class

LCIC supports interactive one-to-one class, delivering a smoother teaching experience. It supports various class application features like screen sharing, courseware presentation, whiteboard, graffiti, mic connect, and recording playback, enriching and diversifying online interactive classes.

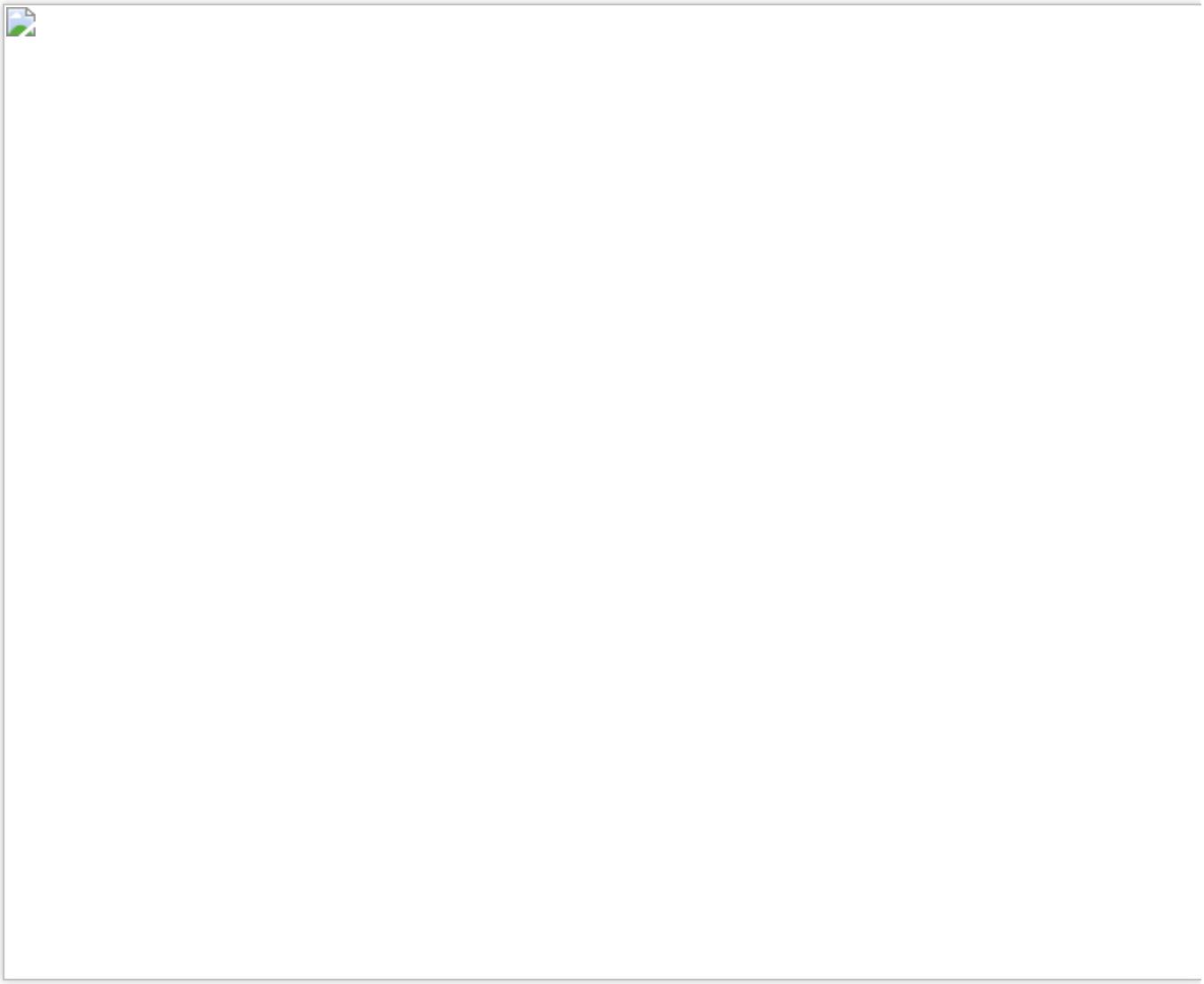
It supports various teaching tools, making online teaching more efficient.

It allows the teacher to interact with students in real time to build a warm student-teacher relationship.



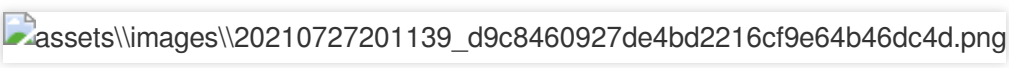
Small class

LCIC supports interactive small classes in multiple sizes, delivering a smooth teaching experience. It offers various class application features like screen sharing, courseware presentation, whiteboard, graffiti, mic connect, recording playback, group interaction, and clicker, enriching and diversifying the online teaching methods. The entire lecture can be recorded and then played back on demand later, helping enhance the learning results.
It enables up to 16 students to mic on and interact at the same time.
It supports multiple layouts, suiting the teaching scenarios in different industries.



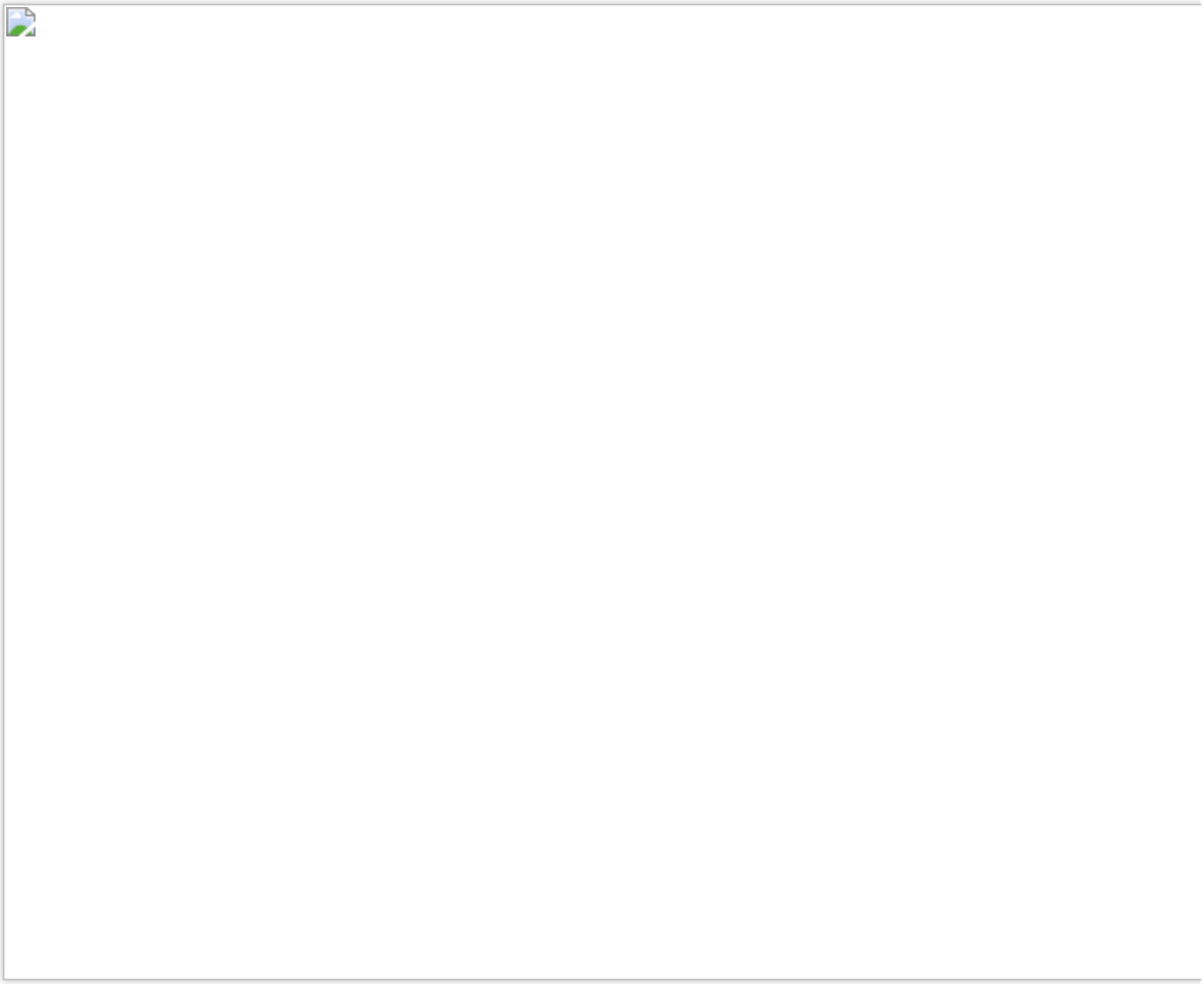
Large class

LCIC allows multiple students to attend class online simultaneously and have real-time interaction with the teacher. It supports various class application features like screen sharing, courseware presentation, clicker, roll call, and recording playback, enriching and diversifying online interaction in large class forms.
It supports various interaction capabilities, including mic connect, courseware sharing, and roll call, effectively reducing the costs while guaranteeing the teaching effects.
It supports playback on many devices, making classes available to many users.



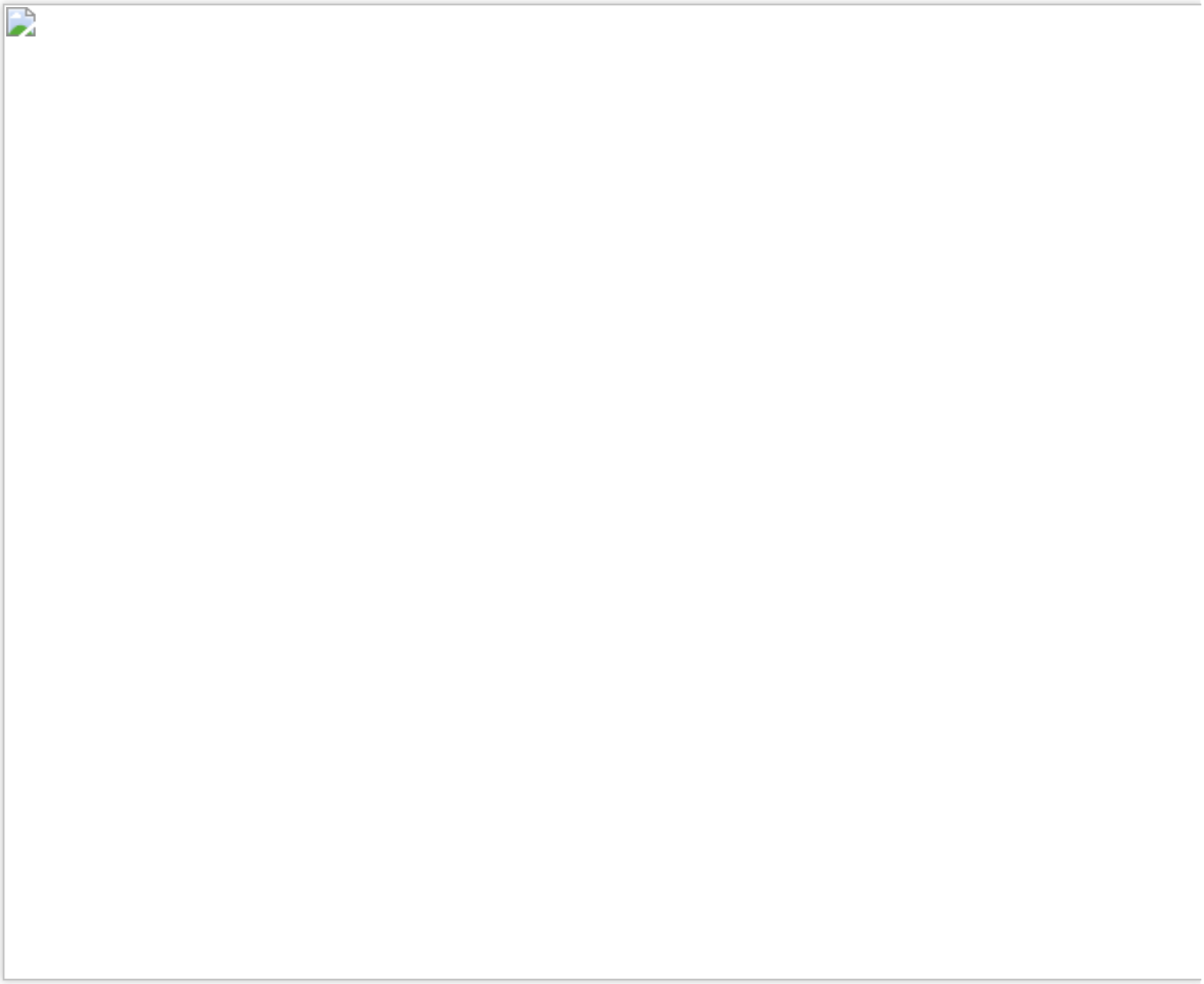
Open/Live class

LCIC allows up to 10,000 students to view a class through live streaming, so top teachers can share their knowledge with a broad audience. The teacher and students can interact by asking and answering questions, playing games, and reading together, making the class more engaging and guaranteeing a high-quality experience.
It supports interaction through mic connect for effective teaching at lower costs.
It supports playback on multiple devices to reach a wider audience.



Dual-teacher class

LCIC allows a teacher to teach online and another teacher to manage the in-person class at the same time. This makes full use of high-quality educational resources while guaranteeing a real-world teaching experience.
It is compatible with interactive screen hardware, making dual-teacher classes more flexible.
It supports the teaching assistant and spectator roles to help teachers stay focused on teaching.



Online study room

LCIC allows students to study together and prompt each other to stay focused through mic connect and live streaming. It also enables the teacher to answer students' questions after class in real time, enhancing their emotional connection.

It supports many capabilities such as mic connect and screen sharing, helping the teacher answer students' questions at any time.

It supports camera connection and roll call, increasing the teaching efficiency.

Features

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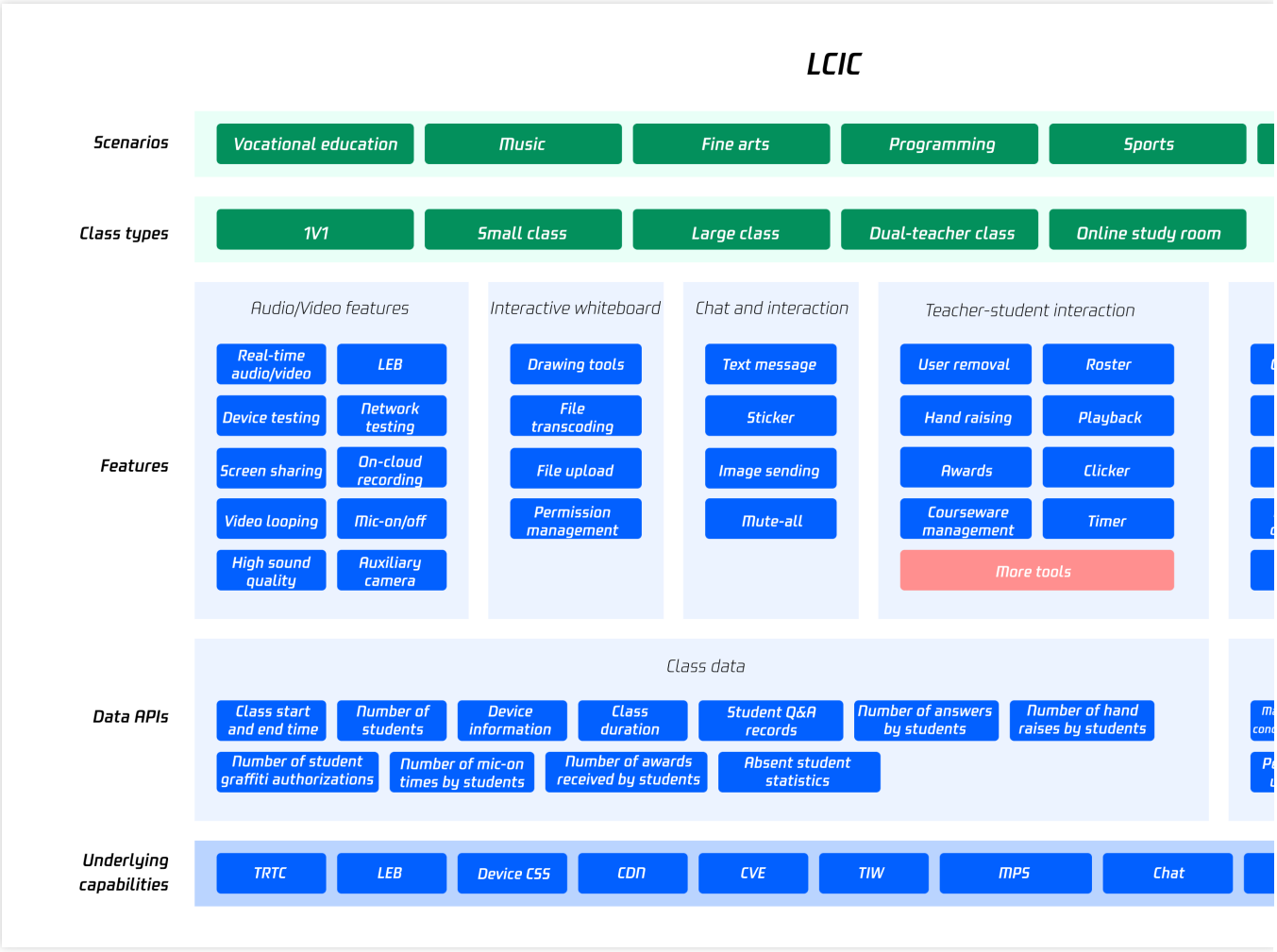
Product architecture

The entire product architecture of LCIC is as shown below:



Basic features

Feature	Description

Audio/Video interaction	Multi-person real-time audio/video interaction: Up to 17 users can turn on their camera simultaneously. SD, HD, and FHD image quality levels are supported. Mic connect: Users can mic on/off smoothly without waiting for switchover. Mic rotation: The teacher can enable mic rotation to let every student speak in turn. The teacher sets the duration for each student's mic to stay connected, and each student will mic on in sequence. Screen sharing: The local computer desktop, a webpage window, or an application can be shared to others. Auxiliary camera: The teacher can use two cameras for teaching. For example, a piano teacher can set one camera to show their face and set the other camera to show their hands during a piano lesson. Video wall: The teacher/teaching assistant can enable the video wall to take a group photo with students, perform video sign-in, or watch multiple students giving a presentation together.
Interactive whiteboard	Features such as moving, box selection, pen, laser pointer, text editing, shape drawing, eraser, screencapturing, zooming, and page turning are supported. Student graffiti permissions: The teacher/teaching assistant can grant students the graffiti permission so that students can graffiti, add text annotations, and turn pages on the whiteboard or in courseware documents. The teacher can copy and paste images from chat messages to the interactive whiteboard to show and write notes on them.
Courseware management	The teacher/teaching assistant can upload courseware before or during the class through the API for teaching. The following courseware document formats are supported: PPT, PPTX, DOC, DOCX, PDF, PNG, JPG, JPEG, GIF, BMP, MP3, and MP4. The teacher/teaching assistant can select a courseware document to show it on the interactive whiteboard. Supported operations include page turning, graffiti, text annotation, audio/video playback, and sync display on students' screens.
Chat messages	Users can send text, emojis, and images (PNG, JPEG, and JPG) in the chat and on-screen comment areas. Mute all: The teacher/teaching assistant can mute all students to prevent them from sending text, images, or emojis in the chat area.
Member management	Roster: Comprehensive role (teacher, teaching assistant, spectator, and student) permission control capabilities are supported. The teacher/teaching assistant can manage members by granting/revoking permissions for sharing, graffiti, message sending, and turning on/off audio and video devices.
Interactive teaching tools	Class awards: The teacher can give awards such as trophies to students during the class. Clicker: The teacher can use the clicker to raise questions and ask all students to answer them. The teacher can configure answer options in the clicker and then start a Q&A. After the Q&A ends, the clicker can collect statistics and display the number of students who have submitted their answers and the percentage of correct answers.

	Timer: The teacher can open the timer and set a timed duration. After the timer starts, the time is displayed on the students' screen. Notifications: The teacher/teaching assistant can send notifications to students during the class.

Advanced features

Module	Feature
Room	Configure custom room attributes, such as audio class, audio/video class, and streaming permission approval.
	Configure the class start time. This can be used for class scheduling and automatic start of a class.
	Configure the class duration. This can be used for class scheduling and automatic ending of a class.
	Configure a duration to prolong a class. After the duration elapses, the room will be closed, users in the room will be removed immediately, and other users cannot join the room.
	Configure the maximum number of concurrent mic-on students. By default, up to 17 users can mic on simultaneously.
	Configure whether students automatically mic on upon entering the class.
	Configure whether to enable a student to automatically mic on when there is an available seat for mic connect.
	Configure the region to ensure that the class is in the same region where courseware and recording files are stored.
	Listen for events during the class to sync them in real time.
User	Configure custom user attributes, including profile photo and age.
	Display the roster. Information such as camera and mic status and number of awards of all users in class are displayed.
	Customize awards.
	Invite a student to mic on and speak.
	Configure permissions of roles such as teacher, teaching assistant, spectator, and student.

Stream	Configure video encoding attributes, including bitrate, resolution, and mirrored video.
	Encrypt and moderate audio/video streams.
	Configure beauty filters and special effects. Various value-added capabilities including smart beauty filters, special effect filters, makeup stickers, virtual backgrounds, and gesture recognition are provided.
Device and media	Detect and turn on/off audio and video devices like headsets and microphones.
	Control video rendering.
	Control audio playback.
UIKit	Configure multiple languages. Chinese, English, and Japanese are supported.
	Adjust the class layout. The teacher can switch the class layout based on their own teaching characteristics.
	Change the class color.
Widget	Implement custom plugins like interactive whiteboard, clicker, and timer.
Recording	Configure the resolution of recorded videos.
	Configure the storage address of recording files.
	Configure the recording start and stop time.

Strengths

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Low code-based quick integration and launch in just 15 minutes

LCIC greatly reduces your development needs by enabling you to quickly import Tencent Cloud PaaS services (such as TRTC, TIW, Chat, and on-cloud recording) and comes embedded with a client UI, allowing you to develop your online class application in as little as 15 minutes. Common online class backend management capabilities are offered as APIs. You only need to manage your backend UI and development to quickly integrate LCIC and launch your classroom application at low costs.

Component-based design for flexible features and a high extensibility

LCIC supports a wide variety of interactive class feature components, including audio/video, interactive whiteboard, courseware presentation, real-time messaging, recording playback, and screen sharing. It also supports different management roles such as teacher, teaching assistant, and spectator. Components can be combined flexibly like building blocks, and standard APIs make it easy to meet diverse needs across different education scenarios.

Flexible customization to build a unique brand

LCIC not only provides a built-in UI but also allows you to customize the product logo and change background colors so as to match your brand’s unique style. You can write code to adjust the UI layout and style to customize the UI for your school. All custom capabilities are implemented through CSS/JavaScript code, so you can simply write the code, and it can run on various platforms. You can even customize very complex business logic by writing JavaScript code.

Compatibility with various platforms and devices

The LCIC client supports various mainstream platforms, including Windows, macOS, Android, iOS, Weixin Mini Program, and web browser, and is perfectly compatible with over 5,000 device models. It can run smoothly on various devices such as Android TV and Android TV box.

Comprehensive statistics

LCIC offers comprehensive usage statistics and interaction feature data to help you gain deeper insights into users and usage billing and assist you with marketing, operations, monitoring, and management. You can also collect and process relevant data like attendance data, study reports, and user profiles.

Numerous ecosystem partners

Tencent Cloud has gained rich experience in online education and teaching scenarios by serving over 200,000 educational institutions. By integrating experience and success stories from the education sector, LCIC offers various model cases for reference and rich feature components. LCIC can also connect with other ecosystem partners, including WeCom, Tencent Docs, Tencent Cloud, QQ, and Weixin, to share resources and expand operations.

High concurrency

LCIC is deployed on distributed edge nodes to allow global teachers and students to enjoy faster access. It features multi-path transfer over the entire network, smart dynamic routing acceleration, and imperceptible scheduling and switchover to guarantee high availability. Based on a highly elastic network architecture, it can sustain loads over 10 times greater than those during normal off-peak hours. A channel with millions of users and tens of millions of concurrent requests can also be well sustained.

Low latency

LCIC offers a highly connected, reliable, and secure network across the globe. Leveraging our proprietary multi-addressing algorithms, it has the ability to stream users' audio/video data to optimal nodes across the entire network. With abundant high-bandwidth resources and globally-distributed edge servers, it can ensure an average end-to-end latency of below 300 ms between countries/regions. Based on over 2,000 global network nodes, network optimization is implemented specifically for countries/regions of teachers in Southeast Asia, Northeast Asia, India, Middle East, North America, and Africa, delivering a high-quality transfer rate of 99% or higher over the global network.

Low lag

LCIC reduces the lag rate using smart QoS control and optimized encoding. It guarantees high-quality, smooth, and stable audio/video communication even under poor network conditions (packet loss of over 80% and network jitter of over 1,000 ms).

High quality

LCIC supports 720p and 1080p video and allows video streaming even under a packet loss rate of 70%. It supports 48 kHz audio and uses the industry-leading 3A technologies of Tencent Ethereal Audio Lab to remove echo and howling. End-to-end 128 Kbps bitrate and dual channels ensure a clear and immersive audio interaction experience.