



## Collaborative Learning Annotation System (CLAS)

Project	2014FL2_ARTS_ISIT_Cutler
Faculty Lead	Dr. Fred Cutler
Start Date	May 1 <sup>st</sup> , 2014
Cost	\$236,245.00
Duration	20 months
Number of Courses Impacted	91
Number of Students Impacted	5000+

## Executive Summary

### Overview

The Collaborative Learning Annotation System (CLAS) is web application software developed by the Faculty of Arts. CLAS is a video platform for education which facilitates feedback, peer-learning, self-reflective study, and performance review. The platform provides tools for capture, management, delivery, and discussion of media content for instructors, mentors, learners.

CLAS began as a research prototype in 2010 and was repurposed as a teaching and learning resource starting in September 2012, when it served its first course. In January 2014, CLAS had served 24 course sections and over 1000 students. Since May 2014, while being developed with Flexible Learning and Faculty of Arts funding, CLAS has continued to be offered as a production service and has served a further 91 course sections and an average of 2500 students each year. The users of CLAS are about 75% in the Faculty of Arts, 15% in the Faculty of Education, 5% in the Faculty of Medicine, and 5% in the Faculty of Science and Vantage College. Outside of Teaching and Learning, a specially-configured version of CLAS has been used as the admission portal for the UBC school of music to receive online auditions from international applicants.

### Project Summary

CLAS has proven to be a useful tool for a variety of purposes in teaching and learning. It facilitates feedback on performances or skill-learning, either by peers or by instructors, and as part of assessment or not. It also enables students and instructors to identify the level of understanding through discussion and questions-and-answers. In addition, CLAS has been used for a variety of administrative processes, such as admissions, faculty hiring, and peer review of teaching. The following are some of the distinguishing product features that have been built to respond to users' pedagogical and administrative needs.

Comments and Annotations. Users add annotations or comments directly to the timeline of the video; they have the ability to start threaded discussions, tag them, and use audio, video and weblinks within the annotations.

Video Sourcing and Capture. Users can capture high-quality video directly within the application using a webcam and upload the video directly to the **UBC Video Share** system with just a few clicks, thereby adding the video to their own 'playlist'. Videos from UBC Mediasite, YouTube, Dropbox, and other cloud locations can be placed into CLAS with a simple copy-and-paste of the URL. Metadata such as name, course, group, and recording dates are applied to the video automatically to shorten workflow.

Integration with UBC systems. CLAS is integrated with **Connect**, allowing students to have a single and simplified log-on. CLAS can also be embedded in **UBC Blogs** and **UBC CMS** in just a few clicks. CLAS has an automatic reconciliation of **SIS** enrollments and is fully compliant with UBC Identity Management practices and has passed privacy impact assessments (**UBC PIA**).

Video Library Management. Users can easily assign videos to a course or multiple courses, group(s), or a single user. CLAS has a role-based access control of assets and features, which is customizable for each department or course.

User Interface. CLAS and its video player is tested and fully functional on all major browsers (Firefox, Chrome, IE, Safari). A mobile interface is available with all core features such as recording, uploading, annotating, and commenting.

Learning Analytics. CLAS generates a comprehensive course report for instructors or administrators that includes granular *and* aggregated information on the viewing and commenting behaviour of each user (student) on every video. It can be aggregated by video and then by student, or aggregated by student over all videos in a course. The report can also be anonymized for research purposes.

### **Pedagogical Benefits**

ArtsISIT carried out a series of semi-structured interviews with instructors who have used CLAS in their courses, ranging from Social Work to Music to Film Studies, at undergraduate and graduate levels. They were asked to consider how the integration of CLAS had an impact on their teaching and on student learning. For most of the instructors, CLAS is a new tool, and this was reflected in the discussions, as they implemented some fairly simple approaches at the beginning, but then discovered the potential for the tool and have plans for the next iteration of the course that takes further advantage of the tool to improve learning.

Please refer to the section Pedagogical Benefits for more information about how instructors have found operational improvements in the use of class time, reflection, students engagement, and its impact on teaching approaches and future plans for their courses.

### **Service Support Model and Statistics**

CLAS is architecturally designed for multiple virtual instances (tenants) that are all parts of the same physical installation. This achieves a separation of data and access control for privacy requirements, while satisfies the needs of instructional designers and instructors to have an administration dashboard to manage and customize courses according to their own requirements.

To reduce the impact to support units, the CLAS website (<http://clas.ubc.ca>) was launched in the second quarter of 2015. Besides providing users with information about the system, an enrolment form, and guidelines for use, the site contains experiences and recommendations from instructors who use CLAS. In addition, users of CLAS could find a sign-in dashboard, and guides for instructors and students, both in video and print-friendly format.

During its five years of life CLAS has had over 250 requests for support, with 60% concerning course creation in the system and inquiries about enrolment. So far, the vast majority of requests about CLAS coming from users were related to problems with their actual computer or mobile device, instead of CLAS itself.



While Arts ISIT is committed to continue offering tier-2 and tier-3 support for the system, it is recommended that a Faculty which is interested in implementing CLAS and will be dealing with more than 50 courses, should consider allocating a 0.3 FTE for the beginning of each term (September and January), and at least 0.1 for ongoing support. It is important to note that the ratio for support does not include support to students, which is normally provided by the instructor-and-TA team.

Please refer to the section CLAS as a Service for more information about its service charter, model and support requests statistics

### **Project Team**

Project Owner and Lead: Dr. Fred Cutler

Programmer Analyst : Thomas Dang

Instructional Support: Arts ISIT Learning Center team (Angela Lam, Jenny Wong, Leanna Chow)

User Support: Arts ISIT Help Desk team

Graphic Design: Lenkyn Ostapovich and Leanna Chow

Project Manager: Ricardo Serrano

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## Evolution of CLAS

### Introduction

The CLAS (Collaborative Learning Annotation System) project was a funded FL/TLEF and Faculty of Arts project that ran from May 2014 through December 2015. The goal was to build a video-for-learning application to be deployed as a service to UBC faculty for course use. CLAS is now running at UBC as a pilot service, hosted on UBC infrastructure and maintained by the Faculty of Arts.

CLAS is a video platform for education. It is course-based and integrated with the UBC student information system, but also permits arbitrary grouping of internal users and guest users from outside UBC. It is a video platform that allows uploading, embedding of video from the cloud (YouTube, Dropbox, Mediasite etc.), and video management. For students, instructors, and staff, the key feature is threaded commenting tied to specific time points in the video. These features and functions have all been developed and/or refined during the period of the FL grant.

### History of CLAS

In 2010, Dr. Alan Kingstone, Dr. Evan Risko, and Dr. Tom Foulsham in the UBC Department of Psychology wondered about the social and cognitive processes by which students take notes from lectures, and in particular how students extracted value from lectures by identifying the key concepts and information. Realizing that studying this research question required lectures recorded on video and measurement of students' behaviour, Arts ISIT asked Dr. Kingstone if the unit could work with the three psychologists to build an application that presented video lectures and allowed students to click at a point-in-time when they thought an important concept was being presented. These point-based annotations could be aggregated to see how much commonality existed in students' pinpointing of key times in the lecture. The prototype application was successful for this research purpose, leading to a research publication.

In 2011, CLAS received funding from the Faculty of Arts to re-design the prototype as a web application to make it more widely accessible and scalable. Professor Kingstone and Dr. Evan Risko worked with Dr. Shane Dawson and John Bratlien at Arts ISIT to re-develop CLAS. The project drew upon their shared research and pedagogical interests to re-position CLAS as an integral learning and teaching resource. In 2011 the team re-released CLAS as a video annotation tool, providing a medium by which students and teaching staff could collaboratively engage in "meaning-making" around course content through time-stamped text comments and replies.

The 2012 academic year saw the first use of CLAS as a teaching and learning resource. Professor Marvin Cohodas in Art History and Professor Paul Kopas in Political Science began to use CLAS to host lecture videos with an optional note taking component. Music Professor Robert Taylor and Dr. Jonathan Girard began to use CLAS to review conducting practice and orchestral performance videos. The faculty of Medicine explored the use CLAS for peer-commentary, where junior students could learn from more senior ones.

The current generation of CLAS emerged through Flexible Learning grants from the UBC Faculty of Education and Faculty of Arts, over the period from 2014-2016. The vision for CLAS was expanded once more as a “video platform for learning” that focuses on peer-to-peer and instructor-to-student interaction. A new pedagogical impulse was to give instructors a mechanism to observe and guide students’ learning process. Another focus was on rapid configurability of workflow, features, and sharing by department, course, and role, without extra development or downtime, so that CLAS could be a one-stop service that fitted diverse instructional needs in a sustainable way rather than a purpose-built application for one course or one pedagogy.

The original developer and architect of CLAS was John Bratlien, former software engineer at Arts ISIT. Since 2013, the developer and architect is Thomas Dang, a software engineer at Arts ISIT. As Dr. Dawson departed Arts ISIT in 2013, Dr. Fred Cutler, professor of Political Science and Academic Chair of Arts ISIT, took on the project ownership role for “CLAS at UBC”. Thomas Dang took on the product strategy and quality control process. Ricardo Serrano took on project management and service strategy. The Arts Learning Centre team, Angela Lam, Jenny Wong, and Leanna Chow, in collaboration with Sharon Hu, Faculty of Education, took on service operation, training, and documentation.

## Growth in impact and reach

### Growth in number of users

Before CLAS was funded by the FL initiative (from Sept 2012, when CLAS served its first course as a Teaching and Learning (T&L) tool, to Jan 2014) CLAS served 24 course sections and just over 1000 students. From Jan 2014 to Jan 2016, while being developed with FL funding, CLAS has served a further 91 course sections and about 4800 students-in-courses (as opposed to unique students, which would be somewhat lower). Of these, about 3600 (75%) were active users who logged into CLAS multiple times and watched multiple videos and/or made use of the discussion or private bookmarking features. The users of CLAS are about 75% in the Faculty of Arts, 15% in the Faculty of Education, and 5% in the Faculty of Medicine, and 5% in the Faculty of Science and Vantage College. Note that CLAS has been until now promoted only within Arts and in a very *ad hoc* way by Instructional Support staff in other faculties. There has been little ‘sales and marketing’ effort, since this was not in the project mandate. Users from other faculties have mostly been single instructors who approached Arts ISIT independently after learning about CLAS from word-of-mouth or from research conferences and literature.

Of the courses that currently use CLAS, 14 courses (representing about 22 repeating sections each academic year) have integrated CLAS deeply as core activities, mandatory for participation credit or for grades. Most other courses on CLAS, although not using it as a core component, have been repeatedly using the system from year to year, a testament to its quality and ease-of-use.

Figure 1 shows the usage growth in T&L from the 2013/2014 academic year to the 2014/2015 academic year.

	2013/2014				2014/2015				2015/2016				Cumulative
	Winter		Summer		Winter		Summer		Winter		Summer		
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	
Play from second 0	13234	10203			7132	17136			16348	11686			75739
Seek and play from middle	55518	48730			36783	66993			43794	52503			304321
Views (from any point)	68752	58933			43915	84129			60142	64189			380060
New comments, annotations, and bookmarks	3382	3271			4252	6368			8104	9081			34458
Avg posts per student	3.77				5.01				7.60				
Login sessions	NA	10143			6772	18248			10736	11202			57101
Students (active enrollment for each year)	1763				2118				2262				
Growth								20%					7%
Instructors and staff (cumulative)	66				94				145				
Growth								42%					54%
Unique users	1829				2212				2407				
Growth								21%					9%
Assets growth	865				1714				2618				5197
Growth				###				98%					53%

**Figure 1:** usage growth (T&L) from the 2013/2014 academic year to the 2014/2015 academic year.

Other than usage for Teaching & Learning, CLAS is also used for a number of administrative purposes.

The school of music uses CLAS as a audition portfolio submission portal, a part of its admission process both for the undergraduate and graduate level. This type of usage currently impacts a further 2-300 students and 30-40 faculty members each year, and is expected to rise, as the successful deployment of CLAS to the school of music’s admission process has prompted other units wanting a video component in their admission process, such as Sauder’s MBA program and the school of Journalism, to consider CLAS for this purpose.

Arts ISIT is in the process of implementing a service for the Faculty of Arts using CLAS to host hiring interviews and peer review of teaching recordings. The Indigenous Foundation uses CLAS as an archive of oral history videos.

### Growth in types of usage

Usage types before Jan 2014	Usage types to the present
Flipped classroom with no discussion, only lecture video viewing	Flipped classroom with no discussion, only lecture video viewing
Flipped classroom with optional annotation of lecture videos	Flipped classroom with optional annotation of lecture videos
Group discussion of orchestral performance	Group reflection on orchestral performance
One-on-one coaching of music performance or conducting, with videos all recorded by the	One-on-one coaching of music performance or conducting, with videos all recorded by the

instructor in studio	instructor in studio
	One-on-one coaching of pronunciation, with videos recorded by students from home
	Group discussion and one-on-one coaching of teaching or presentation videos uploaded by students
	Embedded as a video gallery in a UBC blog course site
	Embedded as parts of exams in Connect
	As a video portfolio submission portal for admission
	Personal private note taking
	Flipped classroom, but with mandatory directed and moderated discussion of the video content

### **New web presence and online documentation**

To aid in the promotion of CLAS and to provide a space for consolidated, up-to-date user documentation, Arts ISIT launched an informational web presence: <http://clas.ubc.ca> in June 2015. The site contains an onboarding FAQ, a news feed that is regularly updated with the latest capabilities of the system, case studies from instructors who have used CLAS very successfully, an browsable web manual, and tutorial videos for Students, Instructors, and university administrators.

Twitter account: @ubcCLAS

### **Recognition in conferences and with partner institutions in Canada and abroad**

CLAS was presented at the BCNet 2016 conference in Vancouver, April 2016. The audience included about 20 interested people in learning technology and IT roles from around the province (<https://www.bc.net/clas-ubc-platform-learning-collaborative-interactions-media/>).

CLAS was presented by Thomas Dang and Sharon Hu (Faculty of Education) in the New Media Conference (NMC) 2015 conference in Washington DC. It won an audience choice award, placing 4th out of 28 Idea Lab sessions.

CLAS was one of the data providers for the 2015 UBC Learning Analytic Hackathon, where teams of students explored complex, real world datasets from production learning tools. This was a 2 day event organized by the Learning Analytics and Visual Analytics research group at UBC (<https://blogs.ubc.ca/lava/about-lava/>)



A number of partner institutions have contacted our team at Arts ISIT to express interest in trying CLAS or have used CLAS in pilot courses.

- Intel Education
- Ministry of Education of Singapore
- University of New South Wales
- University of South Australia
- Yale University
- MIT (office of undergraduate admission)
- University of Toronto (school of music)
- American Community School of Abu Dhabi (school of music)
- Crofton House School Vancouver
- Canadian Kendo Federation
- Carey Theological College
- Keck Graduate Institute (KGI)
- Hamline University
- Hershey High School, York College of Pennsylvania
- Otago Polytechnic New Zealand
- Tokyo University of Technology
- University of Georgia
- University of Arizona
- Augustana College

## Architectural Enhancements and New Capabilities Accomplished During FL Project Period

### Multi-tenancy

To satisfy a wide variety of user requirements, course structures and workflows; and to achieve separation of data and access control for departments with strict privacy requirements, CLAS is architected to be multi-tenant. Multiple virtual instances (tenants) that are all parts of the same physical installation of CLAS can be quickly created for individual faculties, departments, or special programs. These tenants can be configured to satisfy the precise requirements of each program or user, without any extra hardware deployment and maintenance. All tenants can also be supported using a common administrative dashboard, which our tier-1 instructional support team use. Each tenant also has a local administrative dashboard, which administrators of each department can use to handle local setup requests.

### User-transparent, nearly-instant remote update

To reduce maintenance and support costs for CLAS *as-a-service* while being more flexible and responsive to users' needs as an evolving product, CLAS was given a remote update architecture. Most updates in CLAS, even major features, can be deployed to one or more tenants in less than 30 seconds, with zero disruption to the service, even to users currently logged in. This architecture and the multi-tenancy were what allowed CLAS to be developed very quickly as a project while also being a production service relied

on by dozens of instructors and thousands of students. Any bugs found are usually fixed and deployed within hours to minimize impact.

### **Course archiving and life-cycle management**

To allow the support team of CLAS to achieve complete independence in running the production service while the development can continue, a feature was added so that support staff can archive a CLAS course after each term and recreate the same course for a new term when required. CLAS will automatically duplicate all the videos in the previous term course that were shared to everyone in the course (not private videos) so that these videos are also available to the new instance of the course, but without the discussion posts and enrollment list from the previous term. If a previous term course was linked to SIS, the new course will also be linked to SIS for automatic enrollment list updates.

### **Embed CLAS in Connect and UBC Blog with automatic session transfer**

CLAS video libraries (or single videos) can be embedded in Connect, UBC Blogs, and any other UBC sites integrated with CWL, without students having to log in again. This is achieved by "gateway mode" integrations with both of the underlying technologies of CWL: Shibboleth and CAS.

### **Annotation and comment threading**

Prior to 2014, users of CLAS could make single annotations or private bookmarks on video timelines. Since Jan 2014, entire conversation chains can be tagged onto timelines of videos and followed with an easily readable breadcrumb trail. With this feature, students can engage in deeper discussions and reflections around videos.

### **Embed a video into an annotation on another video**

CLAS enables video as an annotation medium in addition to normal text annotations. Users watching a video can embed video from a web page on both desktop and mobile, from all major browsers, and the recording becomes an annotation on the timeline of the main video. Alternatively, students can record a video with other software and then attach the final recording to timeline discussions. An early version of the "record a video as an annotation" feature was available from September 2012, but the feature was redesigned more robustly and with smooth user experience during the FL-funded period.

### **Record videos from a webcam or mobile device directly into CLAS**

Instructors can easily record videos for feedback to students, such as for pronunciation coaching or for personal introduction. Students can record or upload videos directly from home, using their mobile devices running either Android or iOS. On the desktop, the webcam recording can be up to 720p depending on the camera, and has automatic noise detection and compensation built-in so that even recordings from home or the field can be audible. Metadata such as current course, current group in a

course, and student names are tagged automatically on each recording to simplify identification and evaluation for instructors.

### **Precise access management and multiple-ownership of video**

Videos in CLAS can be shared as publicly or as privately as any course organization structure requires. The access control for videos in CLAS is very fine and precise: to the general public, to a specific email address, to a department, a course, an arbitrary group of students, or one-on-one between a student and instructors and TA's. The interface focuses each user to only the videos and discussions that are relevant to them. If a course in CLAS has multiple instructors, all of these instructors can share ownership and management rights on the videos in that course, instead of having each video tied to a single CWL. With special consent, this multiple-ownership can also extend to videos from students that had not been shared or were used in a prior offering of the course. Viewing or ownership rights can also be granted across courses to support staff and administrators so that they can manage a whole department or special program. Some of these features were nascent in CLAS before the funding period, but these basic features were automated, expanded, and made production-robust during the FL-funded period.

### **Uploading multiple videos at once**

Users can choose multiple videos to be uploaded at once instead of having to wait for one upload to finish before uploading another or open multiple windows of the upload page. Each individual upload is independently verified for errors and have its own privacy compliant "gate".

### **Privacy policy compliance**

Users uploading videos to CLAS must choose at least one of the copyright authorizations before uploading can proceed. Even when uploading multiple videos, the copyright authorization requirement must be fulfilled for each of them. CLAS has passed a privacy impact assessment (PIA) evaluation.

### **Automatic privacy watermark on videos**

Any videos not shared to public groups (visible to everyone in the course) will have a watermark on top stating whether the video has not been shared at all, or is being shared privately. The watermark will stay while the video plays, even on fullscreen, but does not actually alter the source video.

### **Automatic enrollment list via SIS integration**

Each CLAS video collection can be linked to one or more SIS course sections (creating a so-called "CLAS course") so that the enrollment list for these course will be updated nightly from SIS. Support staff can further modify this enrollment list manually by adding "exception students" without breaking the automatic add/drop from SIS. Pre-FL, CLAS had a manual tool for importing enrollment list of a single

section from SIS into a CLAS course. This basic feature was automated, expanded, and made production-robust during the FL-funded period.

### **External enrollment by invitation**

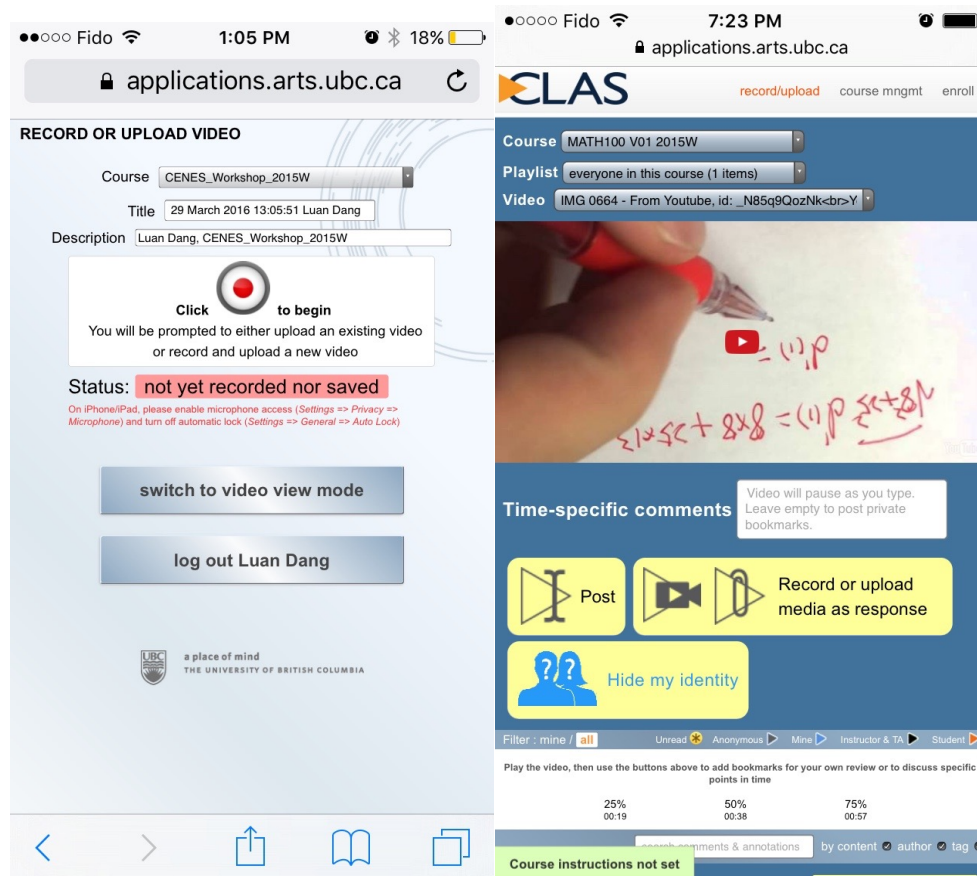
A CLAS course or a single video can now be shared not only to an enrollment list within UBC, but also to external students or advisors outside of UBC. A “self-enroll code” mechanism enables instructors to create a course in CLAS where the student body consist of students within UBC, using a CWL account, or outside of UBC, using a guest account specific to CLAS. External advisors such as working professionals can also be invited to participate as TA’s.

### **Upload quota system**

Administrators can monitor and meter usage for the purpose of increasing system stability or improving the user experience, such as limiting large uploads for courses where students submit videos from home or from the field, to mitigate the effect of slow connections. Quotas can be set per user role, and for 1) total space usage, 2) number of files, 3) maximum size per file.

## Mobile interface

Most features of CLAS, from video viewing to timeline-specific threaded discussion to video responses to video upload and recording are available on mobile devices both iOS and Android. Only the access management interface for instructors and support staff is not yet available on mobile.



## Course instructions and welcome area

Each course in CLAS comes with a default “landing page” with a tutorial video and a special comment panel where instructors and TA’s can put course-wide instructions and messages. The tutorial video changes dynamically to fit the viewer’s role, showing only the relevant features for each user. Instructors can also record their own introduction video, which will then be shown alongside the CLAS tutorial video.

## Preview and pre-annotate videos before sharing

After instructors upload a video or students upload an assignment, that video-producer-user can preview the video to make sure that it plays correctly, and to mark points of interest or make general comments on the video before actually sharing it to an audience.

### **Configure features and behaviours by course**

Each course is different, and CLAS has served a wide variety of distinct use-cases such as flipped classroom, assignment submission, etc. For example, some instructors do not need timeline-specific discussion in their course, but still want to benefit from the precise and flexible access management of CLAS, or perhaps the student hand-in portal functionality, or the ability to aggregate multiple video sources, or the sophisticated analytics, or the ability to invite external students and advisors. Or sometimes an instructor wants to use the discussion feature, but restrict each student from seeing their peers' comments until a certain time. An interface was created to allow support staff or instructors themselves to configure courses, turning on and off workflows and interface elements at will.

### **Playlist with built-in search**

Both the video view page of CLAS and the video management page have playlists with integrated filtering. The search box of this playlist will update the result as you type, and is fast enough to search and display a collection of thousands of videos with virtually no lag time. By default, the newest videos are automatically bubbled to the top of each playlist.

### **Course and group search**

If an instructor manages multiple courses, or creates multiple groups of students in a course, or uses the personal hand-in box feature, then the selection widget for courses and groups also has built-in search functionality. Users can also cross navigate to another course or group by searching for a video title, description keyword, or student name that they remember to be in that course or group; this is often more natural than browsing through each course to find what needs to be reviewed.

### **New shorter URL [clas.ubc.ca](https://clas.ubc.ca)**

To make navigation easier for users, especially on mobile, the url is simple. Furthermore, users do not need to type `https://`, as the CLAS website is configured to always serve over a secure (TLS/SSL) connection.

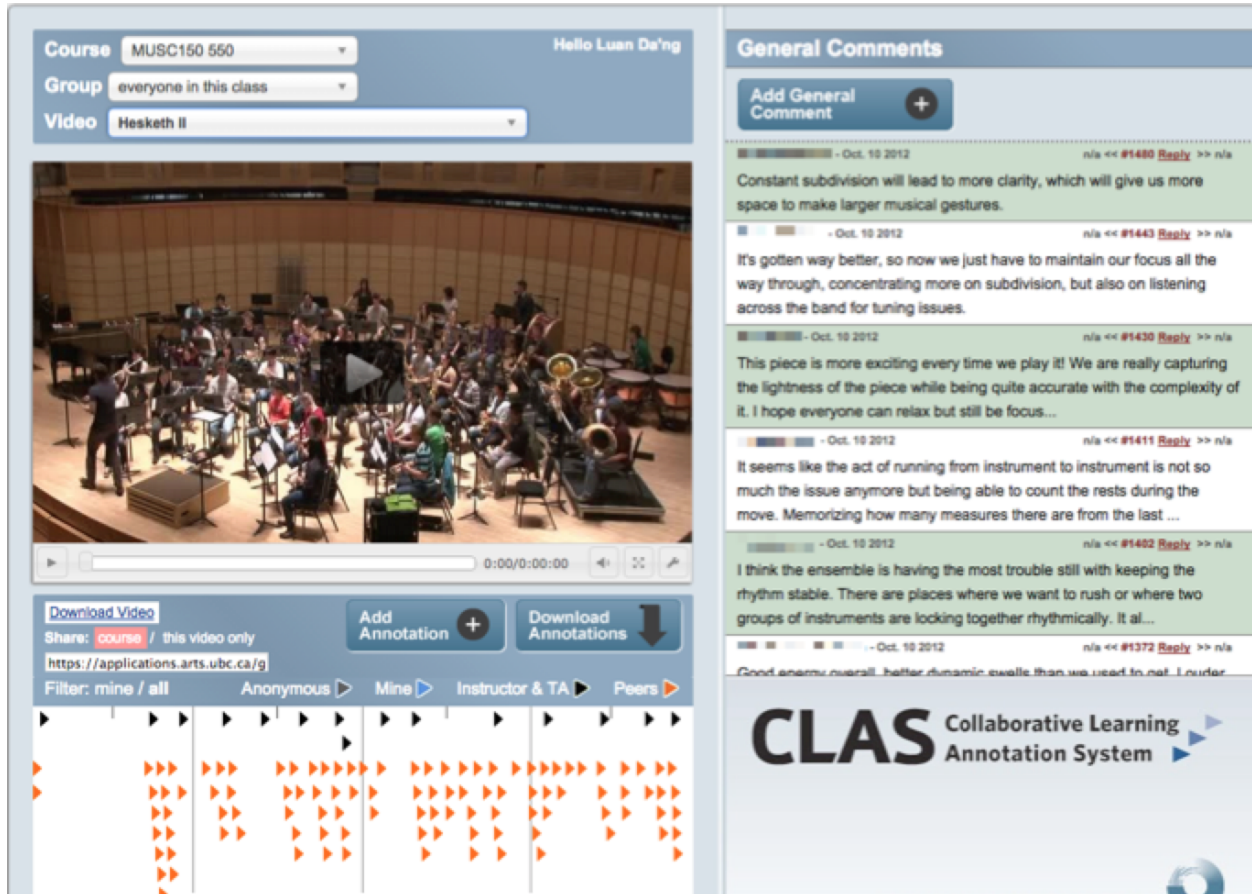
### **Simplified video metadata editing**

Managing videos can be a chore for instructors, so the interface for this should be as simple as possible. In CLAS, instructors can simply click on the title and description of each video and edit them inline, in the same page where they can manage video access.

### **New video view and discussion interface**

Continual improvement is made to the user interface by applying 2.5 years of UX suggestions from users, lessons learned from automatic navigational data collection, and results from a 1.5 year behavioural study from Dept. of Psychology. The old layout (Figure 3) is space constrained in both height and width.

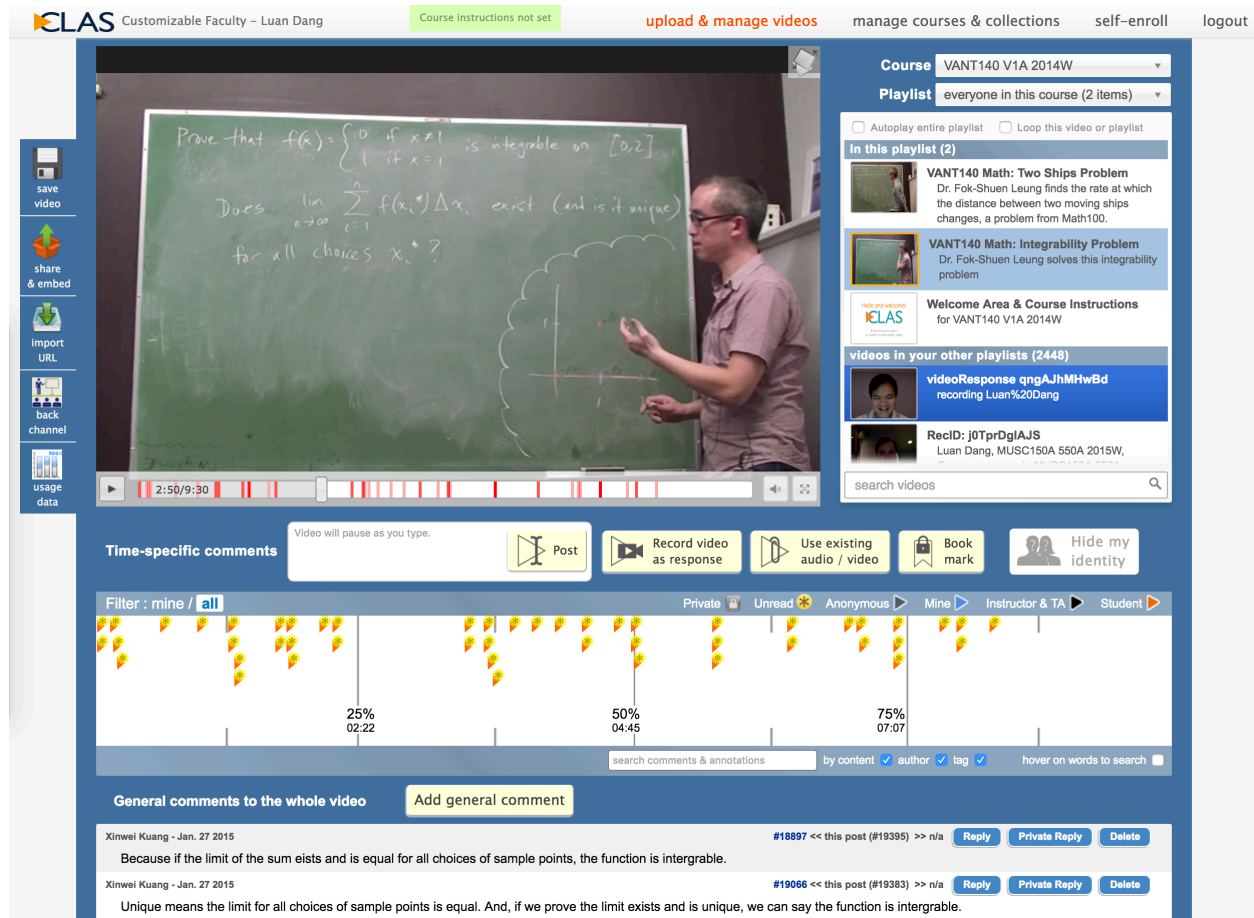
Video browsing and sharing took a backseat to annotation in the old UI, while the browsing and sharing part is the primary activity for effective use of video in T&L.



**Figure 3:** the old video view and discussion interface as of Dec 2014

Annotation is a valuable feature, but it is dependent on effective browsing and finding of courses and videos. Simple, unified navigation and ease-of-finding of relevant materials are emphasized in the new interface (Figure 4). Secondary features such as sharing links or embed codes, downloading video, and downloading analytics data are offloaded to floating side buttons that expand out to floating widgets, no longer taking up space and user attention on the page. This also opened up the possibility of adding more secondary features, such as the “backchannel” and “importing urls from external video sources” that came after this layout redesign, without cluttering this main interface. Special thanks to Sharon Hu in the Faculty of Education for continuously gathering feedback to help the CLAS team tweak the language on the interface to be more familiar to users in educational institutions.



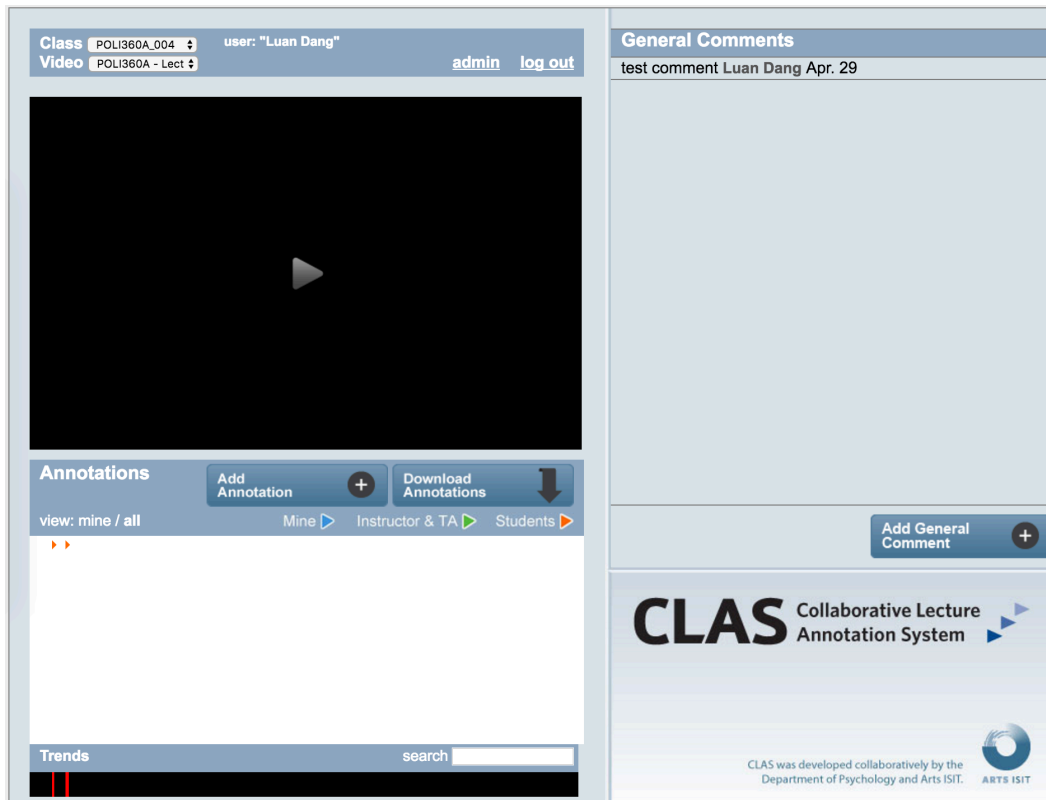


**Figure 4:** the new video view and discussion interface from 2015 onward.

The new interface also incorporated a large number of other UX improvements, such as a stretchable annotation field that can accommodate hundreds of students annotating, a rotate video button to help viewer follow camera angle changes for mobile videos from the field, and read/unread indicators for posts, and an indicator to show which post is private.

To emphasize the visual metamorphosis of CLAS since its very beginning, Figure 5 is a screenshot of the CLAS interface in late 2012.





**Figure 5:** CLAS video view and annotation interface circa Nov 2012

### Annotating a video while watching fullscreen

An unobtrusive annotation interface with a heatmap of attention built directly into the player is now available when users are watching a video in fullscreen.

### Making bookmarks on videos with one click

Students don't need to make full use of the discussion features of CLAS to benefit from it. It is now very easy to use CLAS as a video bookmarking and note-taking tool. This was implemented as analytics data revealed significant voluntary usage of CLAS for personal note-taking on lecture videos.

### A smart playlist for students

Automatic navigational data collection revealed that if watching video was a voluntary component of a course, about 60% of students would spend less than 1 minute browsing courses and playlists, click play on the first video that they see, before giving up and logging out, never to return. The "all I can view in this course" playlist removes the chore of browsing for relevant videos by aggregating all other playlists: group playlist, personal hand-in box, or everyone in the course's video into one list of consumables, with attractive thumbnails and styling. No matter how instructors organize the playlists in a course, each

student will always see what can be viewed right after logging in. After this improvement, the ratio of students who used CLAS repeatedly and watched multiple videos improved from 40% to nearly 70% even for courses where watching videos is voluntary.

### **Importing from Youtube, Mediasite, and Dropbox to CLAS**

Many videos that instructors want to use are already uploaded on Youtube or shared directly out of Dropbox or other cloud accounts. Some lecture videos may also include slides, which are recorded by Mediasite. CLAS now enables you to import a video link or ID from external services: Youtube, Mediasite, and Dropbox. Importing takes under ten seconds from start to finish because the videos remain stored only on the original source. Playing and discussing these external videos on CLAS therefore consumes insignificant resources on the CLAS server. This saves instructors the time and effort uploading videos or collating videos from multiple sources manually into a gallery page on a course blog. In addition, aggregating external videos into CLAS allows these videos to benefit from the unified learning analytics layer in CLAS, which goes far beyond the data gathering of most video platforms. In other words, instructors get detailed reports of student viewing and interaction with videos from any source, including YouTube. "Views" of a Youtube video from within CLAS will also count toward your Youtube statistics, so aggregating content into CLAS for teaching does not take away any of the benefits of uploading a video to a public channel like Youtube. The architecture of the CLAS player also enables future integration of more video sources such as Vimeo.

### **Core feature optimizations**

The discussion features of CLAS were optimized to be at least 4 times faster than before, as of Jan 2015, and should feel snappy from anywhere in the world even on videos with hundreds of annotations. This was tested by partner institutions in Singapore, Australia, and the US east coast. The CLAS video player now also loads almost instantaneously. Up to 20 CLAS players (not thumbnails but actual inline players) can be embedded on a single page, such as a course gallery, and still load within 3 seconds.

### **More natural posting of timeline comments**

All videos in CLAS, from any source, will automatically pause when the viewer starts typing a post, and resume when the post is submitted. This is so that students will no longer need to pause the video to fix the point of discussion before typing up a post. Incorporating new research in visual perception showing that human beings perceive visual stimuli with a delay that can be as high as 15 seconds (but normally much less if the person is attentive to the task), CLAS now has a heuristic to automatically nudge the actual point of a post up 1 to 3 seconds before the typing begins, so that CLAS predicts more closely where a viewer meant for a post to appear, useful for activities where precision is important, such as discussing music or sport videos.

### **More natural viewing of timeline comments**

Before, students could hover on a timeline comment icon to see the content of that post and its position in a thread, but they didn't immediately see the corresponding position in the video until they explicitly

pressed a “seek to” button on the preview. This can be cumbersome and also makes the viewers lose their current play position on the player. CLAS now has a separate hovering “preview player” that displays the frame corresponding to a post when that post is shown. The preview player also allows students to play from that point repeatedly or play in slow-motion for review, without losing the play position on the main player.

### **Discussion moderation**

Instructors and TA’s can see at a glance which posts are new, preview them, and edit or delete them if necessary.

### **Private replying**

Before, you could reply to an annotation or comment in CLAS, but that reply was visible to everyone else too. However, some situations call for a private reply, such as students answering a question from an instructor. Now, there is a convenient “private reply” button beside the reply button, on every annotation and comment. E.g. If students A, B, and C all privately reply to a question from the instructor at a certain point on the video, then only the instructor can see these replies. The students cannot see one another’s replies. If an instructor is viewing a video submitted by a student in his/her course, the instructor can also make a private comment that does not reply to any specific post, but replies to the submitter of the video directly.

### **Videos and discussion analytics**

Instructors and university administrators often want to have metrics reporting on video content for evaluation or research, and need these metrics to be aggregated by student, by course, or even by department, but generic enterprise video platforms often only provide metrics aggregated by video. CLAS offers the ability to download metrics aggregated by video, by students, by course, and by department. These reports are available out of the box, not only to support staff but also to instructors, and are updated daily. In addition, CLAS’s analytics goes beyond the video usage metrics provided by generic enterprise video platforms, by also including discussion metrics. Furthermore, metrics collection in CLAS is more precise: CLAS’s ability to seamlessly inherit login sessions from Shibboleth and CAS (i.e. Connect and UBC Blogs) means that no matter where a CLAS player is embedded, if a user is logged in and views a video, then usage metrics will be collected precisely for each user, not just a total of anonymous views. Finally, CLAS can instantly prepare an anonymous data report to comply with ethics requirements (if the data is used for research) by applying a sophisticated anonymization algorithm. To ensure that the data types collected are meaningful, our development has been continuously guided by requests from instructors using CLAS on multiple different educational scenarios and consultation with UBC Arts ISIT Learning Analytics office (special thanks to Dr. Leah Macfadyen).

### **Minimalist and audio only CLAS embedded players**

Instructors can now embed a minimalist CLAS player (Figure 6) into a course in Connect or UBC blogs.



**Figure 6:** Minimalist CLAS embedded player. The discuss button is optional. The integrated live heatmap reflects an on-going discussion.

The embedded CLAS player will automatically inherit a login session from either CAS or Shibboleth, so that videos can be access-managed without requiring users to log in twice. Learning analytics metrics collected by CLAS will automatically be attributed to the correct user. Students can then click on the “discuss this video” button on the minimalist player to bring up the full CLAS interface, but the discussion feature can also be turned off entirely. The CLAS minimalist player can be further condensed into an “audio only player” (Figure 7) to save vertical space.

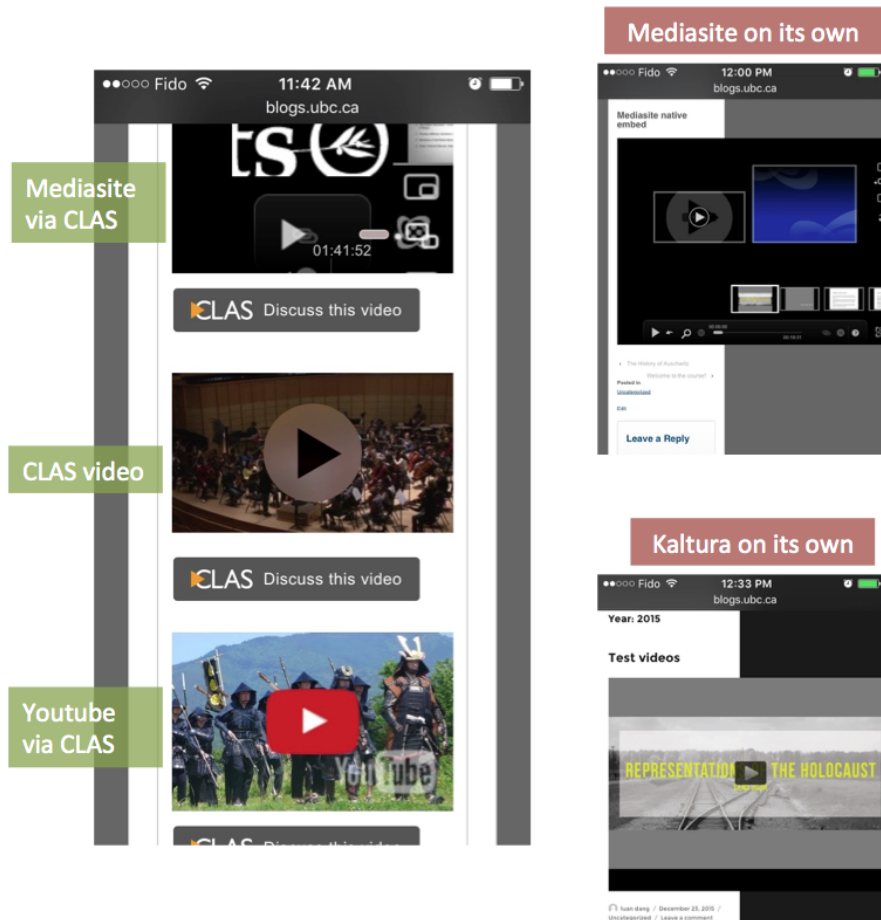


**Figure 7:** Audio only CLAS player, shown without the discuss button

### Automatic player responsiveness on mobile

CLAS embed codes are automatically responsive regardless of the target environment: no prior configuration or resizer plugin is needed. In addition, CLAS can confer responsiveness to other video sources (Figure 8) without an automatically responsive embed code (such as Mediasite) or a responsive embed code that requires cross-domain scripting (such as Youtube), which does not play well with

stricter security policies. The CLAS player achieves responsiveness using pure CSS and Javascript, so it will work regardless of site security policy and does not need any special setup.



**Figure 8:** CLAS player automatic resizing on mobile and conferring this ability to other platforms

### Just-in-time player loading

The CLAS embed code will dynamically load a video successfully even when nested within hidden element, such as the accordions commonly used on websites to selectively display content. This gives content designers the freedom to create layouts without worrying that the embedded videos will fail.

### Video portfolio submission and review mode

A CLAS course, or an entire virtual instance, can be configured with one click to turn into a video submission portal for video assignments by students, or portfolios by prospective students. This feature is currently being used by the school of music for their admission process and in the Faculty of Arts for several courses and for hiring interview evaluation. The interface and language of CLAS changes to focus on the uploading workflow, with specialized sharing options for students to submit to their own private

handin boxes. Students cannot see each other's videos and cannot share videos to each other or to the entire cohort. However, reviewers can browse to each handin box or see a list of all the submissions, ordered by student, at a glance, and can also use the annotation and comment feature in their review, shared only among the other reviewers, enabling asynchronous, anywhere reviewing.

#### **Classroom backchannel mode (BYOD "clicker-style" in-class response)**

CLAS has always been able to annotate existing videos that are uploaded to the system, but what if instructors want to capture the feedback in a live class, as in a debate or a performance? And what if they wish that all those live responses become a recorded annotated video on CLAS afterward, for record-keeping and to let the discussion continue? Instructors have the ability in CLAS to start a "live response session" that will automatically invite all the students logging in to CLAS from any device to respond. No "click receiver" device is needed, only an internet connection. Responses from students can also be not only clicks, but also short write-ins. Afterward, instructors can also upload a video recording and synchronize it with the live responses recorded, to create a regular annotated video in CLAS.

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## Pedagogical Benefits

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ArtsISIT carried out a series of semi-structured interviews with instructors who have used CLAS in their courses, ranging from Social Work to Music to Film Studies, and include both experiences with undergraduate and graduate courses. They were asked to consider how the integration of CLAS had an impact on their teaching and on student learning. For most of the instructors, CLAS is a new tool, and this was reflected in the discussions, as they implemented some fairly simple approaches at the beginning but then discovered the potential for the tool and have plans for future offerings of the course that take further advantage of the tool to improve learning.

### Operational improvement.

For many instructors, the initial motivation to select CLAS came from wanting to provide greater flexibility in time, location, or scheduling of learning for students and for instructors. One instructor moved from doing the videotaping of student teaching sessions to asking students to organize themselves into small groups and make videos of each other. The instructor reported that students enjoyed this autonomy, and took responsibility for producing the videos and helping each other.

In another course, CLAS was selected to make it possible to replace in-class presentations with online presentations when a larger than expected cohort enrolled. In this course, students produced 12-minute multimedia presentations and were asked to view 3 of their classmates' presentations and to answer content-related questions about the presentations. The instructor was very pleased that she was able to save 2 class times that she had previously devoted to presentations and said that students produced higher quality work.

Another instructor selected CLAS to solve the issue of how to share student performance videos with individual students. "Even though it was recorded publically in front of a class, you don't want everyone in the class to have the ability to download that video of one of their peers on their conducting. So the first issue was finding a platform to share more easily, and using CLAS just for its video purposes in a cleaner format, exchanging information with students."

**Improved Use of Class Time.** One instructor had previously tried to set a time in his course for a weekly film series because many students couldn't get their hands on a copy of films they were studying. This proved impossible with so many students coming from various parts of the lower mainland, and so CLAS provided a solution that allowed access to a high quality copy of the film. The result was that the instructor was more confident that students came to class having viewed the materials and so he was able to plan his time in class better.

**Improved Reflection.** The ability to reflect and correct performance is a key pedagogical factor in improving learning and one of the features that CLAS is specifically designed to support. One instructor said "...one of the things that I would attribute to using this kind of system for student reflection is it makes the reflection more precise." Students are able to see a particular moment in time where they



performed in a specific way, something that never showed up in a one-page reflection paper, where they said very generic, very general things such as "I was nervous". With CLAS you are able to capture very specific moments in time, allowing students to make specific changes and improvements.

Another instructor supported this idea, saying: "when I started using CLAS, because the the comment (annotation) has to be *specific to a moment in their video*, they tag it, and they write about it, so it makes the quality of their reflection better because they actually have to do it, number one, and number two, it's much more specific. So I think that has made a big difference. And I actually have some of the old evaluation papers that they used to fill out. It was always my intention to write a grant to compare that kind of instruction to what we're getting with this new kind of video annotation and show how the depth of these reflections have changed so much. The quantity of reflection is greater, and when you're talking about self-reflection, the more time one spends actually thinking and processing and trying to dissect one's own technique and development, the more you're going to learn. I think just quantity improves it. But then again the specificity also really improves it because they're responding to particular moments in the video."

**Higher Levels of Quality of Student Work and Engagement.** In one course, as described above, the instructor moved from 30 minute in-class presentations to 12-minute student-produced presentations in CLAS. The result was that students reported viewing more than the required 3 presentations for an assignment on writing about the content of student-produced presentations. The instructor reported that the presentations were highly creative and most students received high marks.

Well, I like to think that the students are getting better, that they're becoming better conductors. That's the question, right? So, great, they're better at reflecting, that should make them better conductors, right? Hopefully. And that's the thing I want to test, with a study: design an actual study where we can try this and maybe show it compared to maybe another institution or to the same class where one is using this tool and one isn't. Where the idea is that CLAS makes a better conductor, having this tool. My qualitative look at it would suggest that they're getting better than they were in past years because they have this tool. But, you know, my teaching has changed over those years too, maybe getting more honed in on what they need to know, you know? So there probably are a lot of factors that could influence that.

### **Impact on Teaching Approaches.**

One instructor told us that "I must say I'm, more and more, turning to lecturing again, myself. Just because there is a certain appreciation on the end of the students for that. The thing is I come from a very different culture where a lecture is the professor standing on a stage for two hours and speaking about his field of research, which raises the question 'if you have the leading scholar in his field there, why not listen to him speak.' And it seems that the students here indeed see that as a positive, that they, especially with the electives, they get pushed into fields where they have no idea what's going on. And then they appreciate the lecture for that because it brings them from 0 to, well wherever the lecture goes." He went on to express that perhaps a system like CLAS might be used to offer students an opportunity to annotate the lectures at points where they didn't understand something, so that the instructor could review those points and clarify for students.



## Future Plans for CLAS

All the instructors we interviewed were planning to use CLAS again for their courses, and in most cases expand its role. In one course, the instructor would like to provide archives of previous years' presentations as models for students to follow as a learning tool that provides content relevant to the course.

In another course, the instructor will try to use CLAS for 2 times with each of the courses he will be teaching this term. He indicated he wanted to give students more preparation for how to create their teaching sessions by creating his own session and annotating it to offer a model for them on how to annotate such sessions for themselves. This will provide guidelines for them on the appropriate level of self-annotation and has the effect of scaffolding the entire experience.

Another idea for this instructor is to expand use of CLAS to have students do more videos and real-time annotation, potentially recording a class and annotating as a note-taking device.

One instructor wants to find ways to make it more interesting and more rewarding for students to engage with the commentary section.

"The thing is, the export usage data is hopeful. Of course, if you just say 'I will reward engagement on this page' people will play the system if you just do that. And you have to read through everything again, so I just need to figure out a way to actually operationalize that."

And another instructor said he would migrate two weekly writing assignments, where students reflect either on the film or on the reading, to CLAS so students can see each other's work.

One instructor will be giving a workshop on how to use CLAS for language learning because it has "two (or three) clear functions you can put into the language-learning classroom. One is to write your own subtitles. Two is just listen to it over and over, and respond to it or write down the words you don't understand. So this is something for homework assignments which is a wonderful thing for us because students have very little opportunity to engage with original content".

Finally, one instructor told us that "I feel like we're using the tool to about fifty percent of its potential in our classes. I think, for example, maybe the teaching assistants could provide annotations for every student – because we have a teaching assistant for each of those courses. They do person-to-person tutorials with the students, but maybe they would get my commentary in class, and then maybe the graduate TA would give them some annotative commentary as well. So I think there are a whole bunch of other ways we could use it to its full advantage. Especially the video feedback, using your laptop camera and doing a video reply – I think that is a really strong tool that I haven't used enough yet. "

## Suggested Improvements to CLAS

All the instructors interviewed provided a number of ideas for improving the way that CLAS could further improve to make the system even more effective in their courses.

1. Create short video-clips of how the system works as training for students ahead of the actual uploading of their resources to replace written instructions
2. “What is keeping me from having the students complete the assignments in CLAS is that there is not a channel through which I could communicate to students in private.”
3. Create a template for how to make archives of previous terms as archives of learning that students can access at any time.
4. Produce an example of how CLAS can be used as a workable backchannel (classroom response) system
5. It is problematic that students have to sign on to the system once before they can be assigned a group and a video can be attached to them. Because you make that assignment to do that but they don’t always see the value in doing it, so at the start of the year it delays how quickly you can get them using the tool.
6. Additional uses of the new quiz module might be a ‘technical jury, “Alright, play all of your major scales, as many octaves as you can,” you record it yourself and upload it to CLAS, and then your instructor comments on it.
7. Eliminate the delay in uploading the files to CLAS so that students have their videos a half a day faster.

## CLAS as a Service

### Service Charter

**UBC Service:** Learning Services

**UBC Service Offering:** CLAS

**Item:** N/A

**Service Owner:** Angela Lam, Manager – Learning Centre, Arts ISIT

**Description:** The Collaborative Learning Annotation System (CLAS) enables students, instructors, and other observers to embed notes and feedback directly onto the timeline of videos or to the video as a whole. These notes can be shared or hidden and used for collaboration, discussion, and self-reflection. Besides providing annotation and collaboration, CLAS is also a well-equipped video application with features designed specifically to support education, most notably, flexible and customizable access control of both videos and annotations/comments. CLAS is available for use on all major browsers (Firefox, Chrome, IE, Safari). Additional information can be found at [clas.ubc.ca](http://clas.ubc.ca).

- [Dashboard URL: clas.ubc.ca](http://clas.ubc.ca)
- [Users: UBC Community \(faculty, staff and students\)](#)
- CLAS is actively developed by Arts ISIT

### Service Dependencies

- CLAS is hosted in the UBC Data center. The system and database are maintained by Arts ISIT, whereas multimedia files are hosted on UBC IT hardware through the UBC Video Share platform

### Access Requirements

- Arts ISIT handles all department/unit instance setups.
- Access requests are performed by the following Faculty/Unit listed in the table below:

Faculty/Unit	Contact	Email
Sauder School of Business	Jamie Stockdale	<a href="mailto:jamie.stockdale@sauder.ubc.ca">jamie.stockdale@sauder.ubc.ca</a>
Faculty of Education	Sharon Hu	<a href="mailto:sharon.hu@ubc.ca">sharon.hu@ubc.ca</a>
Faculty of Arts and All other faculty/Unit	Arts ISIT Helpdesk	<a href="mailto:arts.helpdesk@ubc.ca">arts.helpdesk@ubc.ca</a>

### **Customers:**

Instructors, students, staff, external users outside UBC

### **Availability:**

Support is available during Arts Helpdesk Hours

Monday – Thursday, 8:00AM – 7:00PM

Friday, 8:00AM – 5:00PM

### **Pricing Model:**

At the moment, there are no costs associated with using the application for UBC users.

CLAS is free for external users on a case-by-case basis since CLAS is still fairly pre-mature (maximum of 30 videos per user).

### **Service Handling and Commitments:**

#### Requests

- All requests are submitted through Service Now to Arts ISIT's single point of contact (ArtsISIT\_HD)
- Standard acknowledgement within 1 business day

#### Incidents

- ArtsISIT\_HD staff will assign incidents based on **priority** (calculated based on urgency and impact in ITIL definition) in accordance to the following categories (high, medium, low)
- Incidents will be managed in the following service level agreement (SLA):
  - **Critical:** Acknowledgement and response within 15 minutes
  - **High:** Acknowledgement and response within 4 hour
  - **Medium:** Acknowledgement and response within 1 business day
  - **Low:** Acknowledgement and response within 3 business days
- Incidents are expected to be resolved in the service level agreement (SLA):
  - **Critical:** resolution and/or acceptable work-around within 15 minutes
  - **High:** resolution and/or acceptable work-around within 4 hours
  - **Medium:** resolution and/or acceptable workaround within 1 business day
  - **Low:** resolution and/or acceptable workaround within 3 business days

### **Service Reporting (Critical Success Factors & KPIs):**

Listed below are key performance indicators (KPI) Arts ISIT will perform at the end of each school term, measured using Service Now's incident management, to ensure continual service improvement (CSI):  
\*Adjustments on how often to run KPI reports on SN can be made at an annual review cycle.

*CSF1: Arts ISIT to meet the service level agreement as agreed to with the clients*

Defined as the percentage of increase or decrease in meeting SLA targets for both acknowledgement and resolution

*CSF2: Improve CLAS Outreach and Tool Usage*

Increase in the number of requests and inquiries about CLAS defined as the number of 'requests' and 'information request'

*CSF3: Disruption of CLAS is minimal to maintain service quality*

Defined as the percentage of service uptime of CLAS alone and maintained at approximately 99.9%.

Defined as the percentage of reduction in the number of critical incidents logged

Note: Service is only disrupted when UBC IT applies patches to the Kaltura servers during a scheduled maintenance. Despite during Kaltura disruptions, videos can still be uploaded onto CLAS.

*CSF4: Performance of CLAS is optimal*

Defined by performing load tests at the end of every milestone of the CLAS project using J-Meter and Selenium. Page load time is to remain within 10 seconds.

*CSF5: Maintain service quality to users.*

Defined by the numbers of satisfied/dissatisfied users that complete the online evaluation form (Qualtrics). A survey link is sent out to users when a ticket is resolved.

Defined by the number of returning users.

Defined by the number of incidents/requests logged per month and to remain within the threshold level presented below:

Incidents	253
Requests	140

Defined by the number of courses and instructors within the Faculty of Arts and to remain within the following threshold limits:

Courses	1970
Instructors	744

## Service Model

**UBC Service:** Learning Services

**UBC Service Offering:** CLAS

**Item:** N/A

**Service Owner:** Angela Lam

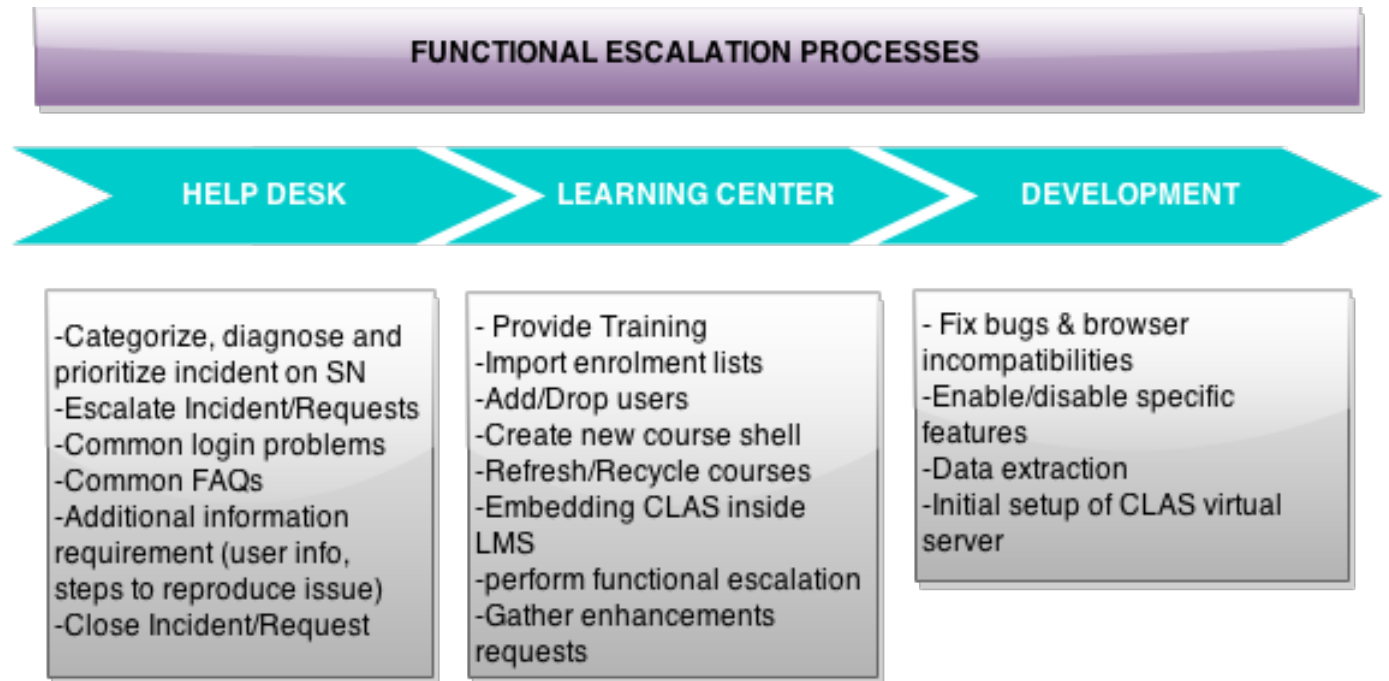
### Description:

The Collaborative Learning Annotation System (CLAS) enables students, instructors, and other observers to embed notes and feedback directly onto the timeline of videos or to the video as a whole. These notes can be shared or hidden and used for collaboration, discussion, and self-reflection. Besides providing annotation and collaboration, CLAS is also a well-equipped video application with features designed specifically to support education, most notably, flexible and customizable access control of both videos and annotations/comments. CLAS is available for use on all major browsers (Firefox, Chrome, IE, Safari). Additional information can be found at [clas.ubc.ca](http://clas.ubc.ca).

- [Dashboard URL: clas.ubc.ca](http://clas.ubc.ca)
- [Users: UBC Community \(faculty, staff and students\)](#)
- CLAS is actively developed by Arts ISIT

### Workflow and Escalation Faculty of Arts:

All incidents and requests are directed to Arts ISIT's single point of contact [arts.helpdesk@ubc.ca](mailto:arts.helpdesk@ubc.ca) and when required escalated as per this workflow.



**Workflow process details and description:**

Assignment Group: *ArtsISIT\_HD*

- Logs, categorizes, prioritizes, escalates and documents all incidents and requests
- Provides first level technical support by diagnosing and troubleshooting common problems either in person, over the phone, via email or remotely through remote desktop
- General information requests about CLAS: <http://clas.sites.olt.ubc.ca/overview-features/>
- Answer common FAQs <http://clas.sites.olt.ubc.ca/faq/>

Assignment Group: *Arts ISIT\_LC*

- Support / Training to Faculty, staff, TAs/RAs
- Support / Train CLAS admin tool.
- Import enrollment list from SIS or CSV list to course
- Add / Drop students, instructors, TA's to course via a CSV list or manually
- Create a new course shell, including non-standard (non-SIS) courses
- Refreshing / Recycling course from term to term
  - If want to reuse video -> clean annotations, reimport enrollment list
  - If want to upload new videos -> archive course, create a new course
- Embedding CLAS inside the Connect Learning Management System (both video view and video management page)
- Replication of bugs reported (e.g. creating/deleting/archiving courses, adding/dropping users, etc.)

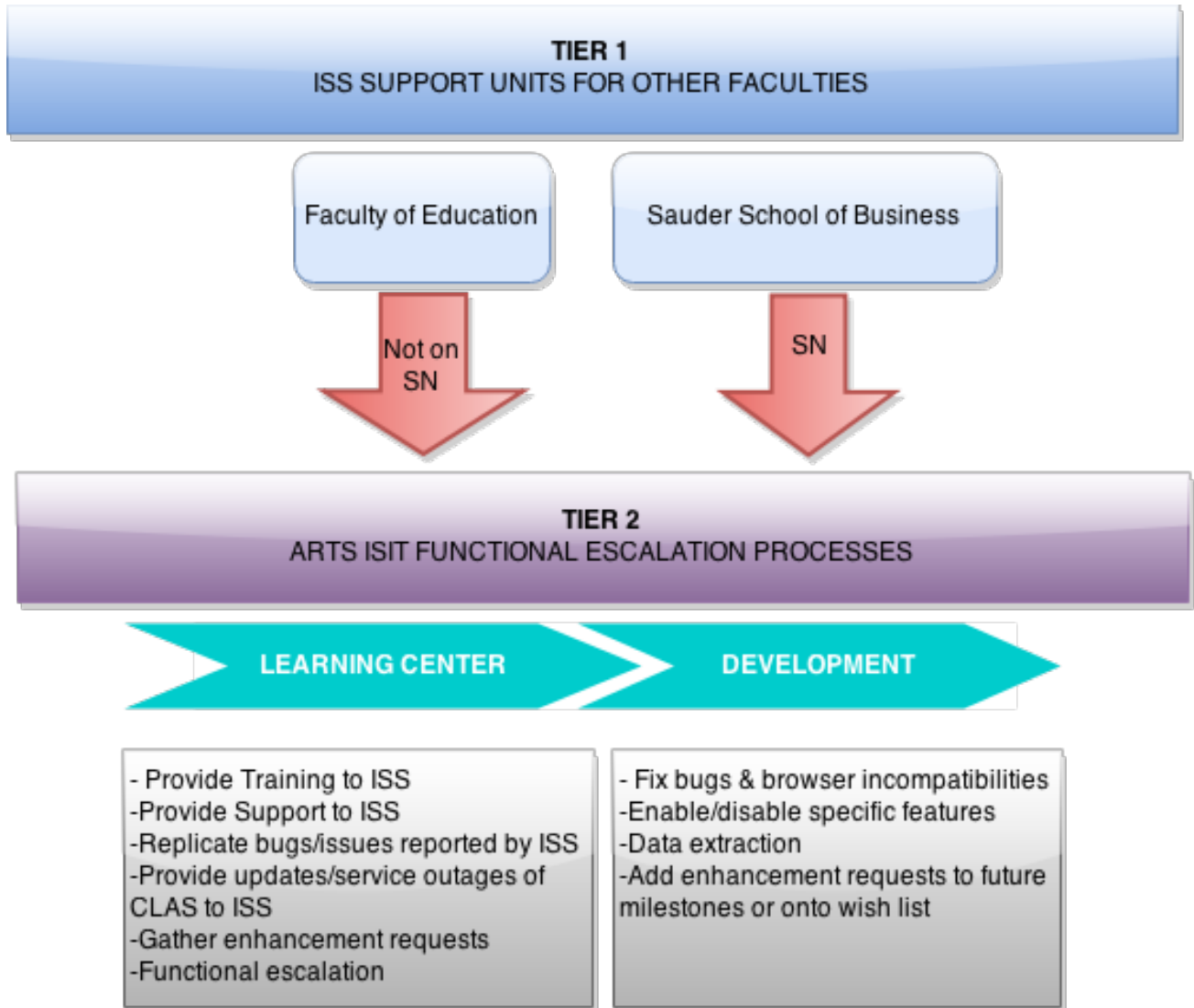
NOTE → Ask user to switch to another browser to determine if it may be a compatibility issue.  
“Core” browsers: Firefox and Chrome (for best experience). “Non-core” browsers: Safari, IE, Opera, UC, etc.

Assignment group: *ArtsISIT\_DEV*

- Fix bugs and incompatibility issues reported
- Enable/Disable course-specific requests such as enable video downloading, disable annotation or comment feature, etc that cannot be performed by Arts ISIT\_LC
- Data extract from CLAS database for reporting
- Initial setup of a CLAS virtual server (should be very rare, e.g. one per faculty)
- System maintenance and security



Workflow and Escalation other Faculties



*Sauder School of Business and Faculty of Education have their own instances of CLAS, therefore, are responsible in providing support for their own Faculty.*

**Faculty of Education**

Contact: Sharon Hu ([Sharon.hu@ubc.ca](mailto:Sharon.hu@ubc.ca))

Service Now: No

**Sauder School of Business**

Contact: Jamie Stockdale ([jamie.stockdale@sauder.ubc.ca](mailto:jamie.stockdale@sauder.ubc.ca))

Service Now: Yes

### Frequently Asked Questions

- Is CLAS only available to instructors in the Faculty of Arts?
  - No, CLAS is available UBC wide. It is also available to users who do not have a UBC CWL. Additional questions or inquiries please escalate to ArtsISIT\_LC.
- Does CLAS have to be linked to an SIS section?
  - No, CLAS can be set-up as an individual course not tied to SIS enrolments.
- Does CLAS only accept video files?
  - No, you can upload both audio and video files to CLAS and it accepts a variety of formats.
- Other Common Problems: <http://clas.sites.olt.ubc.ca/faq/>

### Additional Information and useful links:

Overview and Features: <http://clas.sites.olt.ubc.ca/overview-features/>

Quick Guide: <http://clas.sites.olt.ubc.ca/quick-guide/>

User Manuals and Video Tutorials : <http://clas.sites.olt.ubc.ca/documentation/>

CLAS Updates/New Releases: <http://clas.sites.olt.ubc.ca/updates/>

## Service Support Statistics

