Learning and Sharing Creative Skills with Short Videos: A Case Study of User Behavior in TikTok and Bilibili

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SHORT VIDEOS, ranging from a few seconds to a few minutes, have become a popular form of learning and sharing creative skills such as cooking, drawing, and crafting. Short videos in social media platforms are reshaping the experience of learning creative skills with visually engaging materials and communication features to socialize with other users who have similar interest. However, regardless of their popularity and potential, user behaviors in short video platforms have been under investigated yet when it comes to learning and practice creative skills. This study analyzed 1) viewers' comments on selected drawing skill sharing videos (which resulted in four themes of viewer activities and three types of viewer attitudes) and 2) creators' activities (which resulted in frequent user models by regression analysis and dendrogram analysis) in Bilibili and TikTok. User interviews complement the findings from the quantitative user data to identify the gap between user behavior and expectation in practicing and sharing drawing skills in short-video sharing platforms. The multi-dimensional data about user behaviors and expectations are synthesized into five different personas and user journey maps, leading to the discussion of design recommendations to support creative practice in short video sharing platforms.

Keywords: short videos; social media; learning and sharing skills; user studies

1 Introduction: Creating and Sharing Knowledge in Short Video Platforms

Contemporary communication and media technologies have enabled learning and sharing various kinds of knowledge through online communities (Dron & Anderson, 2014). Social media is a group of Internet-based applications for the creation and exchange of user-generated content (UGC) (Kaplan & Haenlein, 2010). Also, it is defined as *"collaborative online applications and technologies which enable and encourage participation, conversation, openness, creation and socialization amongst a community of users"* (Bowley, 2009). As social interactions are important attributes to transfer knowledge among individuals (Polanyi, 1967), social media can facilitate creating and sharing knowledge among people with similar goals and attitudes (Wahlroos, 2010; Panahi et al., 2012), generating alternative views and new ideas in online communities (Eteläpelto & Lahti, 2008). People tend to hold a positive attitude to collaborative learning on social media because they provide a more interactive experience and motivation during their involvement in knowledge-related activities (Manca & Ranieri, 2016; Mao, 2014).

1.1 Short Video Sharing Platforms

Short video platforms have become a popular form of social media applications among millennials for sharing entertaining contents (Patrick, 2018). Most short video platforms are mobile applications, where users can create, edit, share, and view short videos. Short videos have a standardized short duration ranging from few seconds to few minutes; the relative convenience of content generation, rapid content transmission, and emphasis on sociality are the distinct attributes of short video platforms (Zhao & Wang, 2015).

TikTok is a popular short video platform, introduced in China and fast growing with over a half billion users from all around world (Zhong, 2018). The platform enables many short video specific features such as "Duet" (to create a duet video with another user) and "React" (to comment with a video) to encourage new collaborative and immersive user experiences. Bilibili is a Chinese video-sharing website, which was derived from a Japanese video-sharing website, Niconico, currently with more than 200 million users (Wang, 2016). Videos could last from few seconds to few hours in Bilibili. Besides short video specific platforms, other social media platforms also integrate short videos as one of the UGC sharing media forms. Instagram has released the "Instagram story" feature, which is a personal feed of photos and videos within Instagram and can only exist for 24 hours (Instagram, 2019). The duration of each story is limited to 15 seconds. The feature has reached a great success with more than 400 million active users out of its total 1 billion users (Ahmad, 2018).

1.2 Knowledge and Skill Sharing in Videos

Based on the success of entertainment-oriented short video sharing platforms, knowledge sharing has also become important part of their services. The categories of shared knowledge on TikTok vary from creative skills and personal experience to explicit knowledge such as science, technology, and culture (CBNData, 2017). Su (2018) found that users would have a positive attitude on TikTok because they can learn many skills beneficial in their daily lives. Learning in the form of shorter video will significantly encourage learners to take part in task-relevant activities and reduce task-irrelevant activities (Szpunar, 2013).

Videos have been broadly used in knowledge sharing from social media to Massive Online Open Class (MOOC) platforms. Studies show that viewers are more engaged with knowledge sharing videos shorter than 3 minutes on MOOC platforms (Guo et al., 2014); videos less than 5 minutes are likely to succeed in providing a better knowledge-obtaining experience for users by improving their learning attitude, effectiveness, and engagement (Hsin & Cigas, 2013). Other studies offered insights to improve users' learning experience in video-based MOOC platforms: the ease of access to knowledge in the comment section will help viewers better understand the content of the video (Monserrat et al., 2014); users on collaborative video platforms are more willing to share their opinions and knowledge than on traditional forum platforms (Wu et al., 2018).

2 Research Questions and Methods

Previous studies affirm the potential of short videos as an effective medium for learning creative skills through social interactions and collaborative content creation and sharing. However, most of those studies are about video durations and knowledge sharing in MOOC platforms that have specific learning objectives. User behaviours in short video sharing platforms have been under-studied when it comes to their potential of creative skill sharing where the boundary between learning and playing is blurred. Also, there has been little discussion regarding user experience and interaction design opportunities in popular short

video sharing platforms that serve a huge number of users with different goals and attitudes. This study is motivated to understand user behaviors specifically related to learning and practicing creative skills with the following research questions:

- What are user expectations from posting and watching skill-sharing short videos?

- How do they learn and practice creative skills in short video sharing platforms?

- What may be gaps between their expectations and actual experience in short video sharing platforms regarding learning and practicing creative skills?

- How can we understand user behaviors and improve their experiences of learning, practicing, and sharing creative skills in short video sharing platforms?

2.1 Data Collection and Analysis

There are numerous video contents and different kinds of user activity and profile data available in short video sharing platforms, and it is challenging to define the scope of data collection and analysis. Our research process has been exploratory by selecting specific video posts shared as public knowledge in popular short video platforms and sampling relevant user groups based on their reactions to those videos for further investigation. [Figure 1] overviews our research process that consists of different data collection and analysis methods.
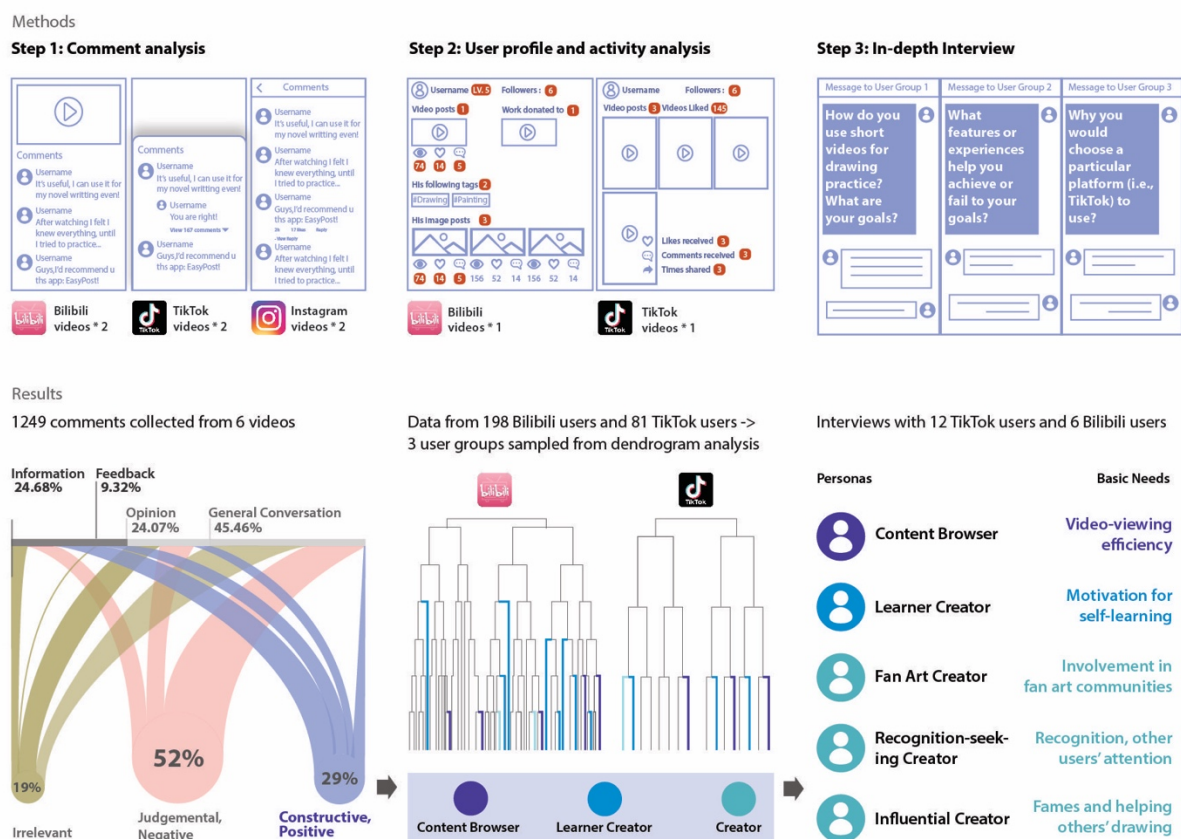

Figure 1. The Research Process.

1) **Platform and Video Selection:** We selected drawing videos from three popular platforms as a topic for this case study: TikTok, Bilibili, and Instagram. According to the search results we retrieved from each platform on April 2, 2019, the videos with a "drawing" hashtag ("画画" in Chinese) have been viewed 142 million times on Instagram and 6.9 billion times on TikTok. We selected highly ranked videos tagged with "drawing" and "drawing tutorial" in each platform: top 2 videos from Bilibili [1,2], top 3 videos from TikTok [3,4,5], and top 3 videos from Instagram [6,7,8].

2) **Comment Analysis:** We collected 1,249 public comments in total from the 8 selected video posts and analyzed their contents and attitudes with a focus on user motivations for learning and sharing creative skills from the videos. We identified some users who are more actively participating in skill sharing and supporting based on their commenting contents and attitudes to the selected drawing videos.

3) **User Profile and Activity Analysis**: We traced the public profile and activity data of the users identified from the comment analysis. 13 kinds of user data were collected from 198 Bilibili users [Table 1] and 8 kinds of data from 81 TikTok users [Table 2]. No personal information was further collected or associated with the online public profile. With Tableau [9] and Excel formulas, we conducted *regression analysis* to find out any statistically significant relations between some user data and *dendrogram analysis* to identify influential factors (i.e., knot) and cluster distinct user groups with those knots as their main characteristics (Qu et al., 2015). The dendrogram was resulted in 52 clusters in Bilibili and 16 clusters in TikTok that divide distinct user groups according to their levels of participation in content creation and sharing.

4) **Pilot Interview:** We contacted 81 users who are grouped in the 16 primary clusters in TikTok for a pilot in-depth interview; 12 of them voluntarily responded back. They shared more details about their purposes of viewing and sharing drawing videos, experiences in TikTok, and expectations regarding their creative practice in short video platforms by direct messages in TikTok, not sharing any other personal information (In average 300 messages exchanged for 30 minutes per interview). Responders' ages range from 13 to 25 with their backgrounds from middle school student, to graduate student, to user experience designer, and to software developer.

5) **User Persona and Journey Map:** We conducted thematic analysis of the interview responses and generated five themes by highlighting worth-noted points from them inductively (Boyatzis, 1998). Each theme is developed into a persona and user journey map with specific experience phases in short video sharing platforms. Design recommendations are discussed to support various user expectations regarding creative practice in consideration of the users' broader life styles and goals.

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[1] https://www.bilibili.com/video/av21462790?t=47

[2] https://www.bilibili.com/video/av33688833

[3] http://v.douyin.com/2W2KHH/

[4] http://v.douyin.com/2WAhEj/

[5] http://v.douyin.com/2WDGwN/

[6] https://www.instagram.com/p/BqkllsRI2ca/

[7] https://www.instagram.com/p/BqlRqofgaVQ/

[8] https://www.instagram.com/p/Bb-F36qAgVl/

[9] https://www.tableau.com/

Table 1 Users' data category on Bilibili (*Top Three Knots)

Data Category	User Data	Justification
User status on the Platform	User's membership level (LV)*	User's LV ranges from level 1 to level 6. LV is depended on the frequency of Bilibili usage and the amount of users' experiences, which can be earned by users' involvement on Bilibili.
	User's followers*	The number of a user's followers can represent the individual's social influences.
Knowledge-consuming activities.	Drawing-related posts user saved*	It reflects the knowledge-document behaviors of users.
	Drawing-related posts user paid	Users can earn the Bilibili coins through multiple involvements on Bilibili. User can use the coin to pay others' posts to show the payer's support and acknowledgment.
	Drawing-related tags user followed	On Bilibili, "tag" consists of a few words that represents a topic. It contains many related resources within the platform. Users use tags for efficient information-searching
Knowledge conversion, creation, and sharing activities.	Drawing-related image posts	N/A
	Drawing-related video posts	N/A

Table 2 Users' data category on TikTok (*Top Three Knots)

Data Category	User Data	Justification
User Status on the Platform	User's followers*	The number of a user's followers can represent the individual's social influences.
Knowledge-consuming activities	Drawing-related posts users liked (i.e., L) *	In TikTok, "like" is a function of saving. It reflects the knowledge-document behaviors of users.
	The ratio of the number of drawing-related posts that a user like to the number of all posts that a user liked (i.e., L/A) *	Like is a behavior that happened very often and random. It will be more accurate to apply L/A to prove if individual's knowledge sharing/learning intentions are stronger than others.
Knowledge conversion, creation, and sharing activities	Drawing-related posts	N/A

3   Research Findings

This section summarizes the findings from the comment analysis, user profile and activity analysis, and pilot in-depth interviews. In this course of multi-dimensional data analysis, primary user groups are specified to further investigate their behaviors related to learn, practice, and share drawing skills in short video sharing platforms.

3.1 Four Comment Categories and Three Commenting Attitudes

Madden et al. (2013) categorized YouTube comments into three categories based on their relevance to the videos: 1) comments related to video content, 2) comments related to video context, and 3) general comments that do not relate to video content or context. Building upon this general categorization scheme, we specified the three comment categories with a focus on user participation in learning and sharing drawing skills. Below are the reframed comment categories that represent four different types of comments:

- **Information type**: Comments elaborating on or requesting explicit information directly related to the posted video, providing an objective statement or point of view. (e.g., *"So, brows decide the styles of eyes."*)

- **Feedback type**: Comments asking for more information about how to apply the video to practice or feedback to the commenter's work created based on the instruction of the posted video. (e.g., *"I got stuck in drawing ellipse."*)

- **Opinion type**: Comments assessing the quality of the posted video, stating the commenter's subjective, often critical, point-of-view. (e.g., *"this is useless"*)

- **General conversation type**: Comments initiating or continuing conversations to interact with other viewers and share information, often not directly related to the video content. (e.g., *"Thank you for your tutorials"*)

Apart from the content types, the collected comments showed three different attitudes that reflect the commenter's engagement in learning and sharing drawing skills:

- **Constructive and positive attitude**: Comments showing interests and curiosity directly related to video content and context, generating questions and discussions to apply the video content to different contexts, share more information, and build knowledge about creative practice (Fosnot & Perry, 1996; Madden et al., 2013).

- **Judgmental and negative attitude**: Comments related to video content or context but not contributing to skill-sharing or knowledge construction nor acknowledging the shared content, mostly aiming to criticize and judge.

- **Irrelevant attitude**: Comments not related to video content or context and irrelevant to the subject or topic of the video, showing ambiguous or no learning intention.

Table 3 shows that the general conversation type of comment is most prevalent (mostly taking a judgmental and negative attitude), while the feedback type of comments is the least in most videos (mostly taking a constructive and positive attitude). The opinion type of comments often shows an irrelevant attitude to learning and practicing creative skills. The overall statistics imply that most comments are intended simply to start a conversation and interact with other users, not necessarily to learn and practice creative skills. Design opportunities lie in supporting this relatively small but highly motivated group of users by prioritizing to reveal and reward their constructive, content specific comments from the majority of irrelevant ones.

Table 3 The percentage data of the comments categorized by the two classification schemes.

	Total	Information	Feedback	Opinion	General Conversation
Constructive, Positive	29%	42.81%	29.94%	14.97%	28.14%
Judgemental, Negative	52%	15.56%	0.0%	19.70%	64.40%
Irrelevant	19%	20.81%	0.9%	54.75%	26.70%
Total	100%	24.68%	9.32%	24.07%	45.46%

3.2   Three User Groups: Content Browsers, Learner Creators, and Creators

We selected another drawing video respectively from TikTok[10] and Bilibili[11] and validated our comment classification scheme by applying it to analyze the comments from the two videos. We also identified active users who made information and feedback types of comments with a constructive and positive attitude to each video; tracked their public profile and activity data to investigate their behaviors related to drawing practice in each platform: 13 kinds of data from 198 Bilibili users [Table 1] and 8 kinds of data from 81 TikTok users [Table 2]. First, *regression analysis* revealed how the two platforms afford different user experiences of creative skill sharing:

- **In Bilibili,** the number of each user's video posts and the number of the user's image posts are highly associated with each other (with $r > 0.7$; $R2 = 0.52$; $p<0.0001$). Users who post work in one format is likely to post in another format. Meanwhile, the total number of image posts (1,257) significantly exceeds that of video posts (193). Also, the number of likes received per video post (i.e., L/P), comments received per video post (i.e., C/P), and view counts per video post (i.e., V/P) present a statistically significant correlation, while the number of users' video posts, L/P, C/P, and V/P are not statically associated. It indicates that users tend to show their appreciation to a video post through multiple reactions after viewing it. However, productive users do not necessarily receive prolific recognitions corresponding to their creative effort.

- **In TikTok,** the number of shares per post (i.e., S/P), L/P, and C/P present a statistically significant positive association. It indicates that viewers more likely reward the video uploader with multiple reactions than once. The number of each user's followers does not statistically associate with the user's L/P, C/P and S/P. This may be due to TikTok's decentralized video recommendation mechanism, which pushes to reveal more user-generated contents to other users, equally regardless of the number of followers. In this way, video posts of the users who comment to another post are more likely to receive as much recognition as influencers who have much more followers on TikTok than on other platforms.

Second, *dendrogram analysis* resulted in 52 clusters in Bilibili (1 – 29 users per cluster) and 16 in TikTok (1 – 17 users per cluster) that divide distinct user groups in each platform. The mean number of users in all clusters from both platforms is 3. Based on this mean value of 3, clusters that have more than 3 users are counted as primary user groups, which resulted

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[10]   https://www.bilibili.com/video/av40642497/
[11]   http://v.douyin.com/jHaCWU/

in 15 primary user groups on Bilibili [Figure 2] and 7 primary groups on TikTok [Figure 3]. The top three knots that cluster primary user groups in each platform are marked in Table 1 and 2. We combined those primary clusters from both platforms into three user groups according to their browsing, reacting, and sharing patterns related to drawing practice [Table 4]: 1) Content Browsers, 2) Learner Creators, and 3) Creators.

Table 4 Data of percentages of the three user groups on Bilibili and TikTok.

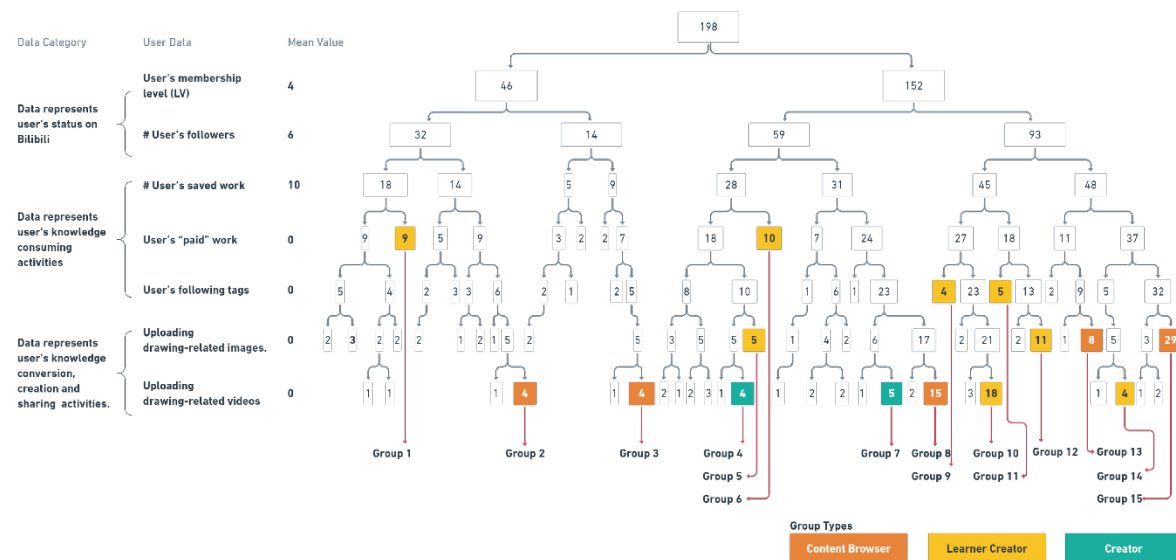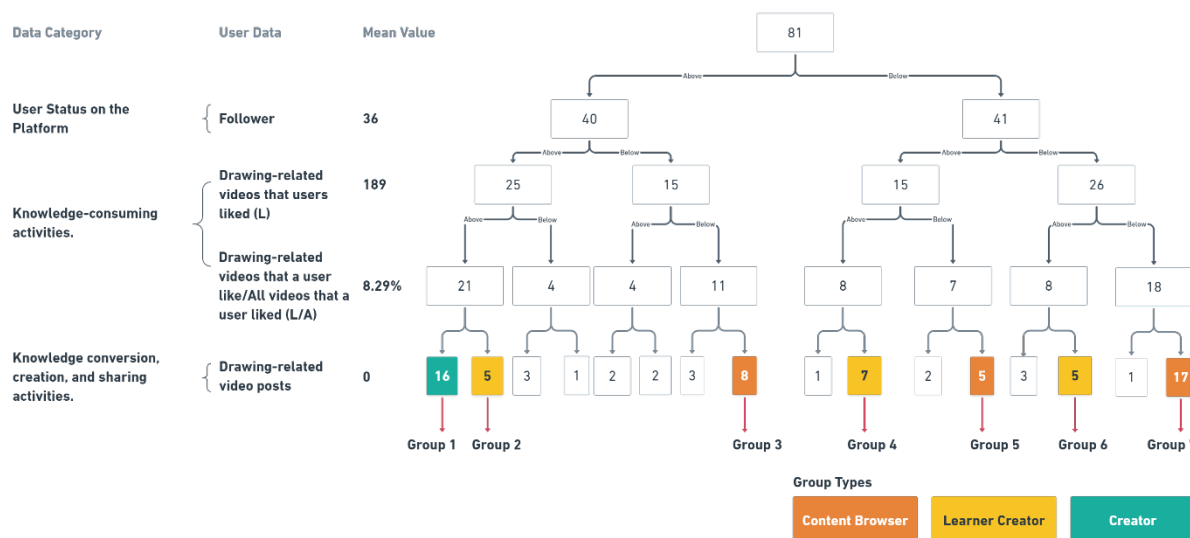| Platform	Content Browser	Learner Creator	Creator	Total Number
Bilibili	30%	33%	5%	198
TikTok	36.7%	20.7%	19.5%	81

Figure 2. The dendrogram of Bilibili users.

Figure 3. The dendrogram of TikTok users.

3.2.1 Content Browser Group:

This group of users takes up a large number of users in the primary clusters (30% in Bilibili; 36.7% in TikTok) but shows less activities related to drawing practice than the average users, rarely creating a drawing video post or reacting to others' work. Majority of users in this group have the value of LV (44 out of 60) and the number of followers (33 out of 60) below or equal to the mean value on Bilibili [Figure 2]. Similarly, all the TikTok users in this group show the number of L and the value of L/A below the mean [Figure 3]. They are involved in limited social activities such as searching or viewing drawing-specific videos, following other users, commenting, and liking, which require minimum commitments.

3.2.2 Learner Creator Group:

This group of users have knowledge learning goals and interests on specific topics such as figure drawing or landscape painting. The majority of users in this group have more than 10 (mean value) pieces of work saved on Bilibili and higher L/A or L than the mean value on TikTok. It implies that Learner Creator Group would like to view and archive certain types of videos according to their learning goals and interact with others by liking or commenting to other posts but rarely post their creative work.

3.2.3 Creator Group:

This group of users have posted their drawing videos in social platforms, active in creating, converting, and sharing skills [Figure 2 & 3]. Table 4 shows that on TikTok, the percentages of Learner Creator and Creator Groups in the primary clusters are similar, but that of Creator Group is significantly greater on TikTok than on Bilibili. Each Creator tends to have more followers than average on TikTok. This echoes to the results of user's behaviour patterns discussed in *regression analysis* above (in the section 3.2). Users tend to follow productive creators and (actively) react to their work in TikTok.

3.3 Pilot Interview with Selected Users from Each Group

As a pilot interview, we sent direct messages to the users from the three primary groups in TikTok (total of 81) for open-ended questions about their experience of learning and practicing creative skills through short videos. 12 of them voluntarily responded back: 2 out of 12 users are from the Content Browser Group; 4 out of 12 users are from the Learner Creator Group; 6 out of 12 users are from the Creator group. Their responses are summarized according to each group's purposes, experiences and expectations in learning and sharing their drawing practice in TikTok.

3.3.1 Main purposes in learning and sharing drawing videos

The Content Browser Group commonly express that they are busy and stressed in daily lives. They have interest in drawing but do not plan to practice. It is relaxing for them to just watch creative practice by others. They enjoy learning more about drawing skills and tips, through which they could also socialize with other users online. The Learner Creator Group are more committed to learn drawing skills by watching drawing videos for self-learning and collecting inspirations. The Creator Group mentioned that online friendship and social recognition are the drivers of their drawing practice; they actively create and share their work for seeking more social interactions and recognition from others.

3.3.2 User experiences and expectations in short video sharing platforms

The Content Browser Group think TikTok provided them with immersive and engaging watching experiences. In particular, they appreciate the short durations of videos, fitting in the limited free time of their busy life. However, they doubt the credibility of the contents

posted by other users: Is it worth watching? Is this a right or better way of practicing drawing? Is this video appropriate to my drawing level?

The Learner Creator Group think learning by watching TikTok videos is efficient because of their short durations and rich contents. They are also satisfied with the video quality on TikTok and expect to discover more. They often apply what they watched and create their own drawings but rarely post because they are afraid of receiving negative and untrustworthy evaluation by public.

The Creator Group like the decentralized content distribution mechanism of TikTok as it exposes their work to more users. While it is easy to watch short videos, they often find it hard for them to create one because of its limited duration. A more guided process to plan and edit their drawing session in a short duration would be useful.

All three groups have complaints about current commenting and searching features in TikTok. They think the current comments section fail to provide an efficient way of retrieving and archiving key information from videos. Also, it was a common response that short video sharing platforms need practical and ethical guidance in posting and reacting to user generated contents to create quality contents and supportive online communities of practice.

4 User Personas, Journey Map, and Design Opportunities

Persona is a fictitious and concrete representation of target users, describing their characteristics and behavior patterns (Pruitt & Adlin, 2006). This chapter synthesizes the insights from the multi-dimensional user data into characteristic user behaviors and expectations based on thematic analysis. The insights are developed into five personas and corresponding user journey maps to illustrate their experience in short video platforms.

Through the thematic analysis, the coded themes of the interview data from the two respondents in the Content Brower Group participated are similar and merged to create user persona 1: **Content Browser**. Also, the coded themes of the interview data from the four users in the Learner Creator are similar and merged to create user persona 2: **Learner Creator**. Additionally, we found differences in the coded themes of the data from the six users in the Creator group; further categorized them to develop 3 personas: **Fan Art Creator** (N=3), **Recognition-Seeking Creator** (N=2), and **Influential Creator** (N=1).

Based on different behaviors of the five personas, we re-mapped the findings from the user profile and activity data to specify the phases that each user persona would experience in a short video sharing platform for their drawing practice. We also integrated the key phases of user journeys across the five personas and discussed the design recommendations for each phase in the integrated journey map [Figure 4]: 1) Creative Practice Through Social Interaction, 2) Video Previews and Comment Categories, 3) Personal Tracking, Assessment, and Guidance for Creative Practice.
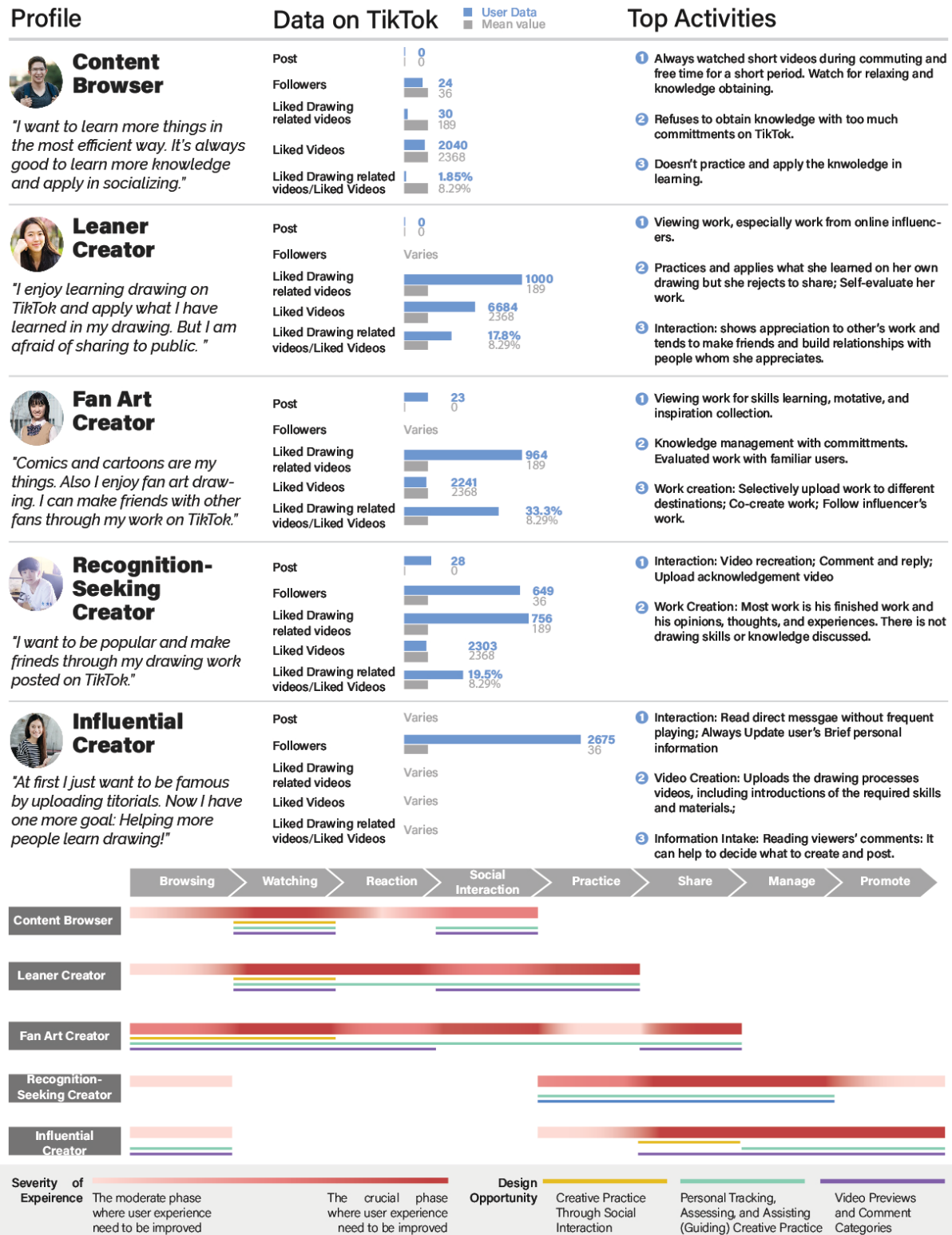
Profile

Content Browser

"I want to learn more things in the most efficient way. It's always good to learn more knowledge and apply in socializing."

Leaner Creator

"I enjoy learning drawing on TikTok and apply what I have learned in my drawing. But I am afraid of sharing to public. "

Fan Art Creator

"Comics and cartoons are my things. Also I enjoy fan art drawing. I can make friends with other fans through my work on TikTok."

Recognition-Seeking Creator

"I want to be popular and make frineds through my drawing work posted on TikTok."

Influential Creator

"At first I just want to be famous by uploading titorials. Now I have one more goal: Helping more people learn drawing!"

Data on TikTok

User Data
Mean value

Content Browser
	User Data	Mean
Post	0	0
Followers	24	36
Liked Drawing related videos	30	189
Liked Videos	2040	2368
Liked Drawing related videos/Liked Videos	1.85%	8.29%

Leaner Creator
	User Data	Mean
Post	0	0
Followers	Varies	
Liked Drawing related videos	1000	189
Liked Videos	6684	2368
Liked Drawing related videos/Liked Videos	17.8%	8.29%

Fan Art Creator
	User Data	Mean
Post	23	0
Followers	Varies	
Liked Drawing related videos	964	189
Liked Videos	2241	2368
Liked Drawing related videos/Liked Videos	33.3%	8.29%

Recognition-Seeking Creator
	User Data	Mean
Post	28	0
Followers	649	36
Liked Drawing related videos	756	189
Liked Videos	2303	2368
Liked Drawing related videos/Liked Videos	19.5%	8.29%

Influential Creator
	User Data	Mean
Post	Varies	
Followers	2675	36
Liked Drawing related videos	Varies	
Liked Videos	Varies	
Liked Drawing related videos/Liked Videos	Varies	

Top Activities

Content Browser
1. Always watched short videos during commuting and free time for a short period. Watch for relaxing and knowledge obtaining.
2. Refuses to obtain knowledge with too much committments on TikTok.
3. Doesn't practice and apply the knwoledge in learning.

Leaner Creator
1. Viewing work, especially work from online influencers.
2. Practices and applies what she learned on her own drawing but she rejects to share; Self-evaluate her work.
3. Interaction: shows appreciation to other's work and tends to make friends and build relationships with people whom she appreciates.

Fan Art Creator
1. Viewing work for skills learning, motative, and inspiration collection.
2. Knowledge management with committments. Evaluated work with familiar users.
3. Work creation: Selectively upload work to different destinations; Co-create work; Follow influencer's work.

Recognition-Seeking Creator
1. Interaction: Video recreation; Comment and reply; Upload acknowledgement video
2. Work Creation: Most work is his finished work and his opinions, thoughts, and experiences. There is not drawing skills or knowledge discussed.

Influential Creator
1. Interaction: Read direct messgae without frequent playing; Always Update user's Brief personal information
2. Video Creation: Uploads the drawing processes videos, including introductions of the required skills and materials.;
3. Information Intake: Reading viewers' comments: It can help to decide what to create and post.

Browsing	Watching	Reaction	Social Interaction	Practice	Share	Manage	Promote

Content Browser

Leaner Creator

Fan Art Creator

Recognition-Seeking Creator

Influential Creator

Severity of Expeirence	Design Opportunity		
The moderate phase where user experience need to be improved	The crucial phase where user experience need to be improved	Creative Practice Through Social Interaction	Personal Tracking, Assessing, and Assisting (Guiding) Creative Practice	Video Previews and Comment Categories

Figure 4. Five personas, user integrated journey map, and the implementation of the three design opportunities.

4.1. Creative Practice Through Social Interaction

While social recognition and responses from other users are vital elements of learning and sharing creative practice in short video platforms, Chapter 3.3 shows that users would not always receive enough recognition for their work. This study proposes three design

considerations to encourage users to create and share work on short video platforms. First, platforms could assign deeper meanings to value video posts beyond clicking "Like", for example, by donating monetary currency. Bilibili users donate "Bilibili coin" to a video post to express their conscious appreciation compared to "Like". It meets their need to more tangibly contribution to the creators and the need of creators who eager for meaningful feedback. Second, platforms could nurture the community to admire and value others' practice and progresses so that more users, like the Learner Creator group would feel more comfortable and supportive to create and share content. For example, Facebook has enabled users to express varied reactions to a post in different emoji icons, which diversify their feedback beyond "Like" or "Dislike". Third, platforms could help creators discover trending challenges for creative practice in relation to their learning goals and connect to other users with similar interest. [Figure 4] shows that this strategy highly targets the problems of multiple user groups in Watching phase and Sharing phase.

4.2. Video Previews and Comment Categories
While short videos are engaging to watch, the research shows that there are opportunities to improve user experience of browsing and archiving video content. First, platforms can provide multiple media formats to describe the videos more accurately in the preview so that users could expect the content before viewing. Second, platforms can provide a rating system to guide skill level requirement of the videos. Third, Chapter 3.1 shows that users with different learning attitudes would preferred different types of comments. Platforms can thus provide a comment categorization and a key information-finding feature for viewers to browse specific types of comments based on their preferences. [Figure 4] shows that this strategy highly targets the problems of user groups with knowledge learning intentions, like the Content Browser, the Learner Creator, and the Fan Art Creator, as well as user group who are with knowledge sharing intentions, like the Influential Creator group.

4.3. Personal Tracking, Assessment, and Guidance for Creative Practice
The research also shows that users encounter many challenges in continuing their practice on short video platforms. Thus, we recommend a learning evaluation and situation prediction system, with which platforms can provide features to track user's activities, progress, and achievements in learning and practicing drawing skills. These strategies aim to build users' learning confidence and keep them motivated on the knowledge learning. Allow users to customize the categories of archiving or tagging videos beyond "like" so that users could easily organize and retrieve them according to their learning levels and goals. This custom categorization could further expand to an adaptive system that automatically generates appropriate category labels and recommends related video posts for archived videos. A template to guide which process to follow to complete a drawing tutorial video and preview the potential outcomes of the work they are planning to create can be useful for beginners. Also, assessing the quality of a drawing posted in a video can allow user to track their progress and for other viewers to consider the quality as their resource for learning. [Figure 4] shows that the users with needs of video watching—The Content Browser, the Learner Creator, and the Fan Art Creator—would be benefited from this strategy.

5. Discussion and Conclusion
This study was motivated to understand users' creative practice in short video sharing platforms and collected popular videos of drawing practice selected from each platform (3 from TikTok, 2 from Bilibili, and 3 from Instagram). Then this study collected viewers' public

comments to selected short videos and developed two new classification schemes: **comment characteristics** (information, feedback, opinion, general conversation) and **commenters' attitudes** (constructive and positive, judgmental and negative, and irrelevant). The statistics show that that less users are actually participating knowledge-related activities (30%) while viewing drawing videos in these platforms by leaving information and feedback types of comments [Table 3]. We also found that those users are more likely to show a constructive and positive knowledge learning and sharing attitude and focused them as a main target group. While our design recommendation for comment categorization targets at this specific group of active users, there are far more passive users who browse and watch videos but rarely leave any comment (i.e., Content Browser). Personalized search and archival of videos and setting and tracking learning goals could lower the barrier of creating and sharing skill-practicing videos in these platforms.

This study further tracked and analyzed public data from Bilibili and TikTok users that can reflect knowledge-related activities. Using *regression analysis*, we uncovered that as Bilibili supports creating and uploading multi-media file formats, users who post more videos are more likely to post more images as well. Users prefer to post their drawing creations in image format versus video format since sharing drawings by images is easier. Another result showed that TikTok is a decentralized UGC community, where users receive reactions and feedback based on the quality and quantity of their work, regardless of the number of followers they have. These findings are further discussed above as design strategies to facilitate user creation and interaction in short-video platforms. This study also finds three major user groups through the patterns of users' data by *dendrogram*: **Content Browser** group, **Learner Creator** group and **Creator** group. The percentage of Creator group (19.5%) on TikTok is greater than on Bilibili (5%), showing that more TikTok users create and share their work as diverse posts are revealed to public regardless of the popularity of creators.

Based on the user group categories synthesized by the quantitative research, this study also conducted pilot interviews with 12 TikTok users via direct messages to further understand experience of knowledge learning and sharing through the platform. The results are synthesized into five distinct types of personas and user journey and experience phases for each persona, concluding with three design recommendations: **1) promote creative practice through social interaction**, **2) provide video previews and comment categories**, and **3) support for personal tracking, assessing, and guiding creative practice**. In summary, the findings of this study imply the potential of new learning models with short videos and social media platforms. The five personas and their user journey maps will provide a constructive foundation to design new platform services and experiences for collaborative learning of creative skills. The methods used for analyzing and identifying distinct user groups could be applied to other online user experience research in the future.

Still, this study has access to only public user data and it is hard to generalize the findings. Also, we do not have a concrete understanding about the expectations and behaviors of passive users who only watch videos for personal practice but do not engage in any online activities. Broader user recruiting and face-to-face interview could lead to in-depth conversations regarding users' expectations and suggestions for improving their learning experience in short video sharing platforms. In future work, the personas and user journey maps could be validated with more comprehensive data from a larger sample and also applied for ideating and developing new short video platform services to support creative practice.

6. References

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