

# Assignment M5

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**Abstract**—The investigated task involves viewing videos on the Instagram app available to smartphone and tablet users. Instagram does not have a function that allows users to fast-forward, rewind, or pause video content. However, there are plenty of similar applications that do allow for this functionality. The goal is to implement a function that prevents users from missing content.

## 1 QUALITATIVE EVALUATION – SURVEY

### 1.1 Overall evaluation experience

Classmates were invited to participate in a survey using PeerSurvey. The survey aimed to gather users' attitudes towards the wireframe prototype developed in assignment M3. The wireframe prototype can be viewed in Appendix 4.1 under question six. The respondents' data was exported and organized in an excel file. Initially, the goal was to gather twenty-five responses; however, the first few responses pertained to existing functionality in the interface (like, share, bookmark). To avoid receiving twenty-five responses about the *existing* functions, the survey was extended to fifty users in total, and modifications were made to the wireframe prototype in question six to highlight the *new* functionality (pause, rewind, fast-forward, scrub bar functions). The survey questions can be seen in Appendix 4.1. In the future, I would spend more time reviewing the survey questions and content to ensure they are clear and draw attention to the correct functions requiring feedback.

### 1.2 Raw data and results

The complete raw survey results can be seen in Appendix 4.2. Cells highlighted in red represent feedback on existing features within the Instagram interface or responses that do not provide feedback (example: N/A). Since the complete set of survey results are extensive, only the latter 20 responses are reported below.

#	Please look at the attached wireframe prototype. Predict the outcome of tapping on the icons at the bottom of the video post (within yellow box). Please be specific.	Regarding the wireframe prototype, was there uncertainty surrounding what the icons represent?	Please elaborate on why you chose your answer for question 7.	What are your likes and/or dislikes about the wireframe prototype from question 7? Please be specific.
30	The arrows means to rewind or fast forward. The one in the middle means pause.	Unsure	Those arrows could also indicate "next video" or "previous video"	If there's a slide box then the two arrows might not be very necessary
31	The arrows move you through the various pictures in the post. If you push one it will slowly pan through the pictures automatically in that direction. Pausing it will stop on that picture.	Yes	I am not confident in my answer.	I like the idea, scrolling is annoying. However, I think the buttons should be spread out further so that you don't accidentally click the wrong one.
32	left arrow would move to previous post/reel, and the right arrow for next and the dragging time bar will ff/rewind	Unsure	N/A	Like: controls are exclusive
33	Previous video (left facing arrow), Pause (pause symbol), Next video (Right facing arrow), Scrub through video (dot on the time line), Mute/unmute (speaker icon)	Yes	Wasn't sure if the arrow icons would rewind/fast forward or skip to the previous or next video	I do like the ability to scrub through a video. Sometimes I want to show someone a video and start from the beginning, but I have to scroll up and then back down to make it restart.
34	rewind video by 5 seconds, pause, forward video by 5 seconds.	Yes	I am not really sure about the left arrow and right arrow.	Maybe include a place to indicate the time. Something like 1:03 / 2:00
35	previous pause next	No	Industry standard	Makes sense
36	adjust video progress	Unsure	It's clear	I like it because I can control the pace
37	rewind, pause, forward	No	It looks clear for me.	It's simple and easy to use. No redundant functions.
38	go to the next image, go to the prior image, stop playback?	Yes	changing images and stopping playback seem unrelated.	I'm not sure what it is doing.
39	Left arrow for rewinding the video, middle button to play/pause, right arrow to fast forward. Slider at the bottom adjusts the volume	No	They're all clear and used consistently elsewhere so easy to infer	I like that all options are shown to the user, although maybe gesture usage could be better for some users, particularly expert users
40	I think it is designed to pause/stop a video. Not sure about the arrows: would it wind 10 secs?.. or will switch to a new video? But which one?	Yes	As I mentioned earlier, I don't know what would happen if I click on the left and right arrow, since different programs do different stuff: YouTube will start a new video, but Facebook will wind 10sec forward.	Overall, I like this feature, I think it is going to be useful.
41	Go back to start, play, go to next	Yes	Does the left arrow icon take us to the previous video or the beginning of the current video?	Like: it's simple. Dislike: see response to #8.
42	I would predict you are either pausing the view of someone's story, going back a video on someone's story, or going forward a video on someone's story	Yes	Some people could think the arrow keys mean rewind the current video in the story	I would bring the button to the right or left, so the user doesn't have to reach their thumb or other fingers as far

43	Pause pauses the video, back goes to the beginning of the video, next goes to the next user's video.	Yes	Because I'm not sure if the buttons advance to a different video or skip ahead or behind in the current video.	It borrows some affordances from many popular music apps with play pause fast forward and rewind. So those seem intuitive although I'm not sure how they will apply in this context but I would think I would learn quickly if I was using a working prototype
44	I think the middle button would pause the video. The left and right arrows would rewind and fastforward. The volume button would maybe toggle between muted or not? The circle and line adjust where you are in the video.	Yes	I am not sure whether the arrows adjust position in the video, or switch to other videos. Also not totally sure if the volume button would mute or bring up a slider to adjust the volume level.	I like that there is a clear way to control playback of the video and adjust the volume because these are definitely issues that I have with the current interface. For the most part the buttons are intuitive and consistent with other interfaces and they are designed so they are accessible but obvious also.
45	Pause, previous vid and next vid	No	based on the icon pictures	nothing
46	it would either stop, rewind, or fast forward the video	No	n/a	its simple and intuitive, i dislike the colors of it
47	Left arrow will go back to beginning of video, middle will pause, right arrow will fast forward or skip to end of video	No	I am able to understand what to do without thinking too much.	Wireframe is good , only uncertainty is what the right arrow does
48	It would either rewind, pause, or fast forward the video being played.	No	The icons are fairly common in video players.	I like that it offers the user more control in navigating through a video.
49	control the video	No	it's used in other video software	N/A
50	last video, stop, next video	No	It's straightforward	add fast forward and rewind buttons

### 1.3 Feedback analysis

The main takeaway from the feedback received is that some icons could be enlarged to avoid misclicks. Furthermore, the presence of the scrubber *and* the fast-forward and rewind buttons are redundant and cause confusion.

Some participants provided surprising feedback. For example, several participants thought that the two arrows on either side of the pause icon would bring the user to a new Instagram post when pressed. I did not consider that users would view the icons in this way. Furthermore, one participant commented on the fact that they watch many craft videos. They said having a pause function would benefit them because they would not have to restart the video and take a screenshot of what they want to view at the exact time it appears in the video. This is the type of user I had in mind when brainstorming design alternatives.

I expected some users to identify the pause button and the scrubber correctly. I also expected some users to have trouble identifying the arrows on either side of

the pause button. There are no labels, and this is not a working prototype, so the function of each button is anyone's guess.

The feedback received from participants taught me that the scrub bar and the pause button are intuitive and consistent with other tools. Even a non-Instagram user was able to identify these two features correctly. Several participants admitted that they would like to control videos on Instagram and that the prototype is reminiscent of existing tools such as YouTube.

The feedback received from this survey suggests a few changes. The first change I would make is to remove the two arrows that represent fast-forward and rewind functions. I would also make the pause button and the circle on the scrub bar bigger. Several users said they were too small, which could lead to misclicks. Also, adding the time elapsed in the video may be helpful as well.

## **2 PREDICTIVE EVALUATION – COGNITIVE WALKTHROUGH**

A cognitive walkthrough is the chosen method for the predictive evaluation of the card prototype developed in assignment M3 (see Appendix 4.3).

The walkthrough begins with a user watching a video on Instagram to create a beginner's origami figure. The goal in this scenario is to follow the how-to video and create the figure. Based on the card prototype created in assignment M4, there is no way for the user to know that the video will pause if they put their phone down. During the cognitive walkthrough, the user will learn this by beginning the video, watching the demonstrator make the first fold, putting the phone down, and creating the first fold themselves. After doing so, the user will learn that putting the phone down will pause the Instagram video. In a way, this gesture is an affordance; it affords the act of moving content out of one's focus. It is also similar (consistent) with smartphones that allow users to decline phone calls by putting their phone face down. Once the user finishes the first fold, they will pick the phone back up to watch the next step in the tutorial. Based on the card prototype, Instagram's interface will show three buttons, one leftward pointing arrow with a label underneath that says, "5 seconds", a play button in the center, and a rightward pointing button with a label underneath that says, "5 seconds".

Tapping the left arrow will rewind the video for five seconds, and tapping the right arrow will fast-forward the video five seconds. Based on this view, the labels under each arrow (principle of discoverability), the directions of the arrows (mapping), and the familiar symbols (principle of consistency), the user should be able to identify the actions available, evaluate their goal, and choose their following action. From here, the user may want to resume the tutorial or hit the rewind button to make sure they did not miss anything. If they hit the rewind button, the video will rewind five seconds and remain paused. The user can tap on the rewind button more than once until they have reached the beginning of the video. Once the user hits play, the video will resume. The user will know that the system's state is being altered because the video thumbnail will change and may look familiar to the user since they are rewinding to a part of the video they have already seen. Once the user resumes the video, they should interpret what they are watching as familiar and conclude that the video was re-winded. Similarly, suppose the user presses the fast-forward button. In that case, the thumbnail will look unfamiliar, and if the user hits play after fast-forwarding five or more seconds, the origami figure in the video will be a step or two closer to the finished product. The user can interpret the state of the video after performing these actions and conclude that they moved further into the tutorial. The card prototype does not specify what happens once the video is complete. Ideally, in this situation, the user will create the last fold completing their origami figure. The demonstrator in the video will confirm that the how-to tutorial is complete and conclude their demonstration. Based on this prototype, only the video contents can confirm if the video is nearing completion or has restarted. The interface itself does not make the current timestamp or the length of the video explicit.

### **3 EVALUATION SUMMARY**

Overall, both prototypes would be altered prior to beginning the next iteration of the design lifecycle. Based on the findings, the wireframe prototype would be adjusted slightly and raised to a prototype of higher fidelity. This higher fidelity prototype could then undergo empirical evaluation. As for the card prototype, adjustments would need to be made, and qualitative evaluation would need to be conducted prior to creating a higher fidelity prototype.

### **3.1 Additional needfinding**

After conducting the cognitive walkthrough, it would be good to know whether users are familiar with other interfaces that pause content using gestures. Part of the card prototype (see appendix 4.3) is gesture-based. Is this something that users will be able to grasp quickly? Will it require a steep learning curve? These questions could be answered by sending out a survey asking users to give feedback on the gesture-based actions within interfaces.

### **3.2 Additional design alternatives**

Both evaluation methods suggested adjustments that could be made to both prototypes.

Based on the responses received during the qualitative evaluation, there are several adjustments I would make to the wireframe prototype design alternative. For starters, I would remove the rewind and fast-forward arrows since their presence is redundant and misleading. Users can use the scrub bar to move to a different part of the video, which is more intuitive than the buttons. I would make the circle on the scrub bar (which represents where the user is in the video) bigger so users can see it better and have an easier time sliding it. I would also add the current timestamp of the video (in minutes and seconds) to the right of the scrub bar.

Based on the results of the predictive evaluation, several adjustments could be made to the card prototype design alternative. First, I would place the current timestamp of the video and the full video length at the bottom right-hand corner of the video post. The timestamp would be presented as 00:30/01:30. In addition, it is not clear to first-time users that placing their phone down will pause the video. A small icon displaying this gesture would need to be placed somewhere on the interface to let users know that placing their phone down to pause content is an action available to them.

### **3.3 Prototype revision**

Based on the positive feedback received from the qualitative evaluation, I would make the minor changes described above and create the same wireframe prototype but of higher fidelity. The higher fidelity prototype would allow users to tap on the pause icon and rewind and fast-forward the video using a scrub bar. In other words, a usable prototype would be developed.

As for the card prototype evaluated using a cognitive walkthrough, the next step would be to alter the prototype based on the changes mentioned above, create a textual prototype, and send out a survey with both prototypes attached to get user feedback.

### **3.4 Next steps for evaluation**

Assuming that changes were made to the wireframe prototype and a higher fidelity prototype of this design alternative was created, the empirical evaluation outlined in Assignment M4 would be conducted using the prototype (see appendix 4.4).

Even after the changes outlined above are made regarding the card prototype, it would not be ready for an empirical evaluation. Another round of qualitative evaluation would need to be conducted to gather user feedback on this design alternative. A higher fidelity (usable) prototype will be created and evaluated empirically if the survey returns positive feedback.

## **4 APPENDICES**

### **4.1 Survey Questions**

**Survey Title:** Instagram Prototype Survey

**Question 1.** Please state your gender

**Answers:** Male, Female, Prefer not to answer

**Question 2.** What is your age?

**Answers:** Under 12, 12 - 17, 18 - 24, 25 - 34, 35 - 44, 45+

**Question 3.** Where do you live?

**Answer:** Open-ended

**Question 4:** Do you use Instagram?

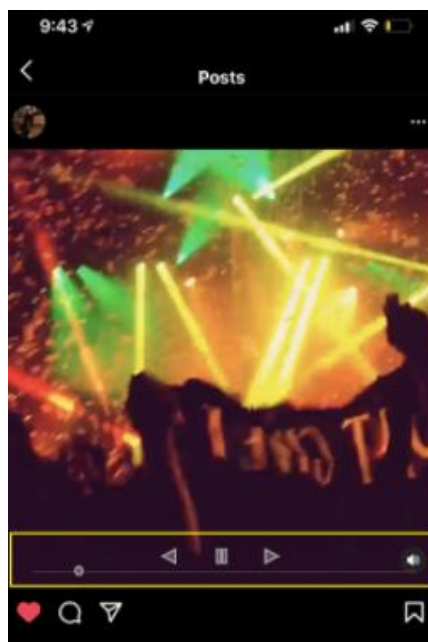
**Answer:** Yes, No

**Question 5:** How much time do you spend per week on Instagram?

**Answers:** less than 1 hour, 1 - 2 hours, 3 -5 hours, 6 - 8 hours, 9+ hours, I do not use Instagram

**Question 6:** Please look at the attached wireframe prototype. Predict the outcome of tapping on the icons at the bottom of the video post (within yellow box). Please be specific.

**Answer:** Open-ended



**Question 7:** Regarding the wireframe prototype from question 7, was there uncertainty surrounding what the different icons represent?

**Answer:** Yes, No, Unsure

**Question 8:** Please elaborate on why you chose your answer for question 8.



**Answer:** Open-ended

**Question 9:** What are your likes and/or dislikes about the wireframe prototype

from question 7? Please be specific.

**Answer:** Open-ended

#### 4.2 Raw survey responses

#	How much time do you spend per week on Instagram?	Please look at the attached wireframe prototype. Predict the outcome of tapping on the icons at the bottom of the video post (within yellow box). Please be specific.	Regarding the wireframe prototype from question 6, was there uncertainty surrounding what the different icons represent	Please elaborate on why you chose your answer for question 7.	What are your likes and/or dislikes about the wireframe prototype from question 7? Please be specific.
2	less than 1 hour	It will pause video?	No	Which question is question 8? The questions are not numbered.	It looks ugly
3	3 -5 hours	heart: like; 2nd: comment; 3rd: send/share; 4th: save	No	the icons are the same with other interfaces	i don't like that the video length is gone. I like to know exactly how much time I will be spending on a video
4	6 - 8 hours	like, chat, share, bookmark	Yes	bookmark?	play buttons are not good
5	less than 1 hour	1-Like, 2-Comment, 3-Share, 4-Bookmark/Save	Yes	Those are the most common functions for those icons	The last icon is confusing
6	1 - 2 hours	Those icons give us a hint what will be to the next step	Yes	The icon must demonstrate the general symbol for example liked sign can be a heart shape	it's easy to select and complete the task
7	less than 1 hour	previous, pause, next	No	the volume icon is visible	Its good
8	less than 1 hour	Heart - Like the video   Chat - Comment on the video   Arrow - Share the video   Bookmark - Save the video to a list	No	The icons are used in many other social apps.	No dislikes, I think the refined interface makes it more social than it currently is. Reminds me of YouTube.
9	I do not use Instagram	Heart: Like. Text bubble: comment: Airplane: Send message to others. Weird shape: Bookmark.	No	I applied consistency of what I know seems to be the right symbol to the mapping of the function.	Think it's quite straightforward, so I quite like that there is no need for explanations to figure out what it does.

10	less than 1 hour	n/a	No	n/a	n/a
11	less than 1 hour	skip back to previous image/video, pause current scene, skip forward to next image/video	Yes	not sure if the arrows are skip forward and back or if they are fast-forward and rewind	looks nice, just unsure what the outcome will be
12	less than 1 hour	Pressing and dragging the small circle will pan to a different part of the video, the pause will pause the video and switch the indicator to play, pressing the speaker will mute/unmute the video, the left and right arrow will fast-forward/rewind the video	Yes	The left and right arrows could potentially indicate moving to the next/previous post, maybe make the arrows the double arrows just to further indicate that it is rewind/fast-forward	Overall, like the wireframe, would like the adjustments in Q8 to make it clearer.
13	1 - 2 hours	Nothing unless it is over the scrubber bar or buttons.	No	Looks like a standard video interface.	Nice to be able to pause.
14	6 - 8 hours	Previous, Pause, Next, audio volume (possibly mute), select point in video	Yes	where the back and forward buttons actually go if it is a post, as many posts aren't video	Better control than the current system, volume seems rather unnecessary
15	1 - 2 hours	play, or pause	No	similar to the buttons in other players	N/A
16	I do not use Instagram	play/pause	No	N/A	N/A
17	3 - 5 hours	see previous post, pause and see the next post	No	The buttons are consistent with what i expect them to do because i have seen them in other interfaces	I dont find the current way of doing these activities bad, i dont think this change would be an improvement
18	less than 1 hour	Dragging the circle on the left would navigate me to that point in the video. The left and right arrow would take me to the previous/next video respectively. The pause button would play/pause the video. The volume indicator would bring up a slide bar for me to decide what volume I want.	Yes	Will the arrows take me to the previous/next video or will it skip forward/rewind in the current video?	Besides the confusion over the arrow buttons, I like the intuitiveness. The circle could probably be a bit bigger though
19	3 - 5 hours	pause the video, fast and back forward the video	No	the icons are very intuitive to how the buttons are in video streaming	I enjoy that you can pause and fast forward. I follow many instagrams about crafts. Whenever they post a video and there is something I like there is no chance to pause the video to observe in more details,

					such as painting for example to get inspiration from. Instead I have to restart the video and be ready to take a screenshot at the time that interests me
20	9+ hours	Left icon is for rewind, middle for pausing, right one is for forwarding. The sound icon to the far right is for muting/unmuting the sound. The progress bar helps user know how far in he is.	No	The icons are clear	I like the ability to be able to control the interface.
21	1 - 2 hours	There is a rewind, pause, and fast forward button, audio button to control volume, and a scrub to identify where in the video it is currently playing.	No	From previous experience, I know what video buttons look like.	Dislike: The rewind and fast forward buttons are redundant if there is a scrubbing function. Dislike: The volume control. I can control that through the physical buttons on my phone.
22	3 - 5 hours	Skips forward/backward to the next video, Pauses video, Scrubs video	No	Im not sure what forward and backward truly does	The icons are pretty tiny so it doesn't seem to useful, I think the scrubber is helpful though.
23	3 - 5 hours	The circle will allow me to "travel" across the video and look for a specific point of interest. I can either go back in it's respective time or go forward. Arrow pointing left will take me to a previous video, arrow pointing right will take me to the next video. Parallel bars will stop the video. Sound icon if pressed will mute out the music.	No	Icons seem intuitive enough to understand what they do since they keep correlation with other interfaces.	I like the consistency it keeps with other interfaces. I dislike that the little circle doesn't tell you a specific time in the video that you'll be going to or show a small frame picture of what's going on in the video at that type.
24	less than 1 hour	Move slider to change time, left and right arrows for next video, middle is pause button, volume on the very right,	Yes	I'm not sure if the arrows move the video forward and back or if they skip to previous/next videos	Slider looks hard to use on a tough screen. Typically I tap the video to mute it and I'm not sure that functionality fits in with these new features
25	less than 1 hour	Left arrow goes to previous video, pause button pauses video, right arrow goes to next video, audio volume button adjusts volume	No	The arrows could either go to previous video or rewind the current video? But not sure how much does it rewind	I like that it is very simple and easy to understand and use
26	3 - 5 hours	First icon will be used to rewind, the middle icon will be pausing and playing and the last icon for fast forward.	No	The icons relates to the normal buttons used generally and so its	I think the prototype describe itself

				very easy to understand the same.	
27	1 - 2 hours	Fast forward, pause, rewind	Unsure	Past interface experience	Unknown
28	3 -5 hours	Forward Backward and Pause	No	These Icons are consistent across many apps	I like the idea of watching everyones posts like an animation
29	less than 1 hour	The arrows means to reweind or fast forward. The one in the middle means pause.	Unsure	Those arrows could also indicate "next video" or "previous video"	If there's a slide box then the two arrows might not be very necessary
30	3 -5 hours	The arrows move you through the various pictures in the post. If you push one it will slowly pan through the pictures automatically in that direction. Pausing it will stop on that picture.	Yes	I am not confident in my answer.	I like the idea, scrolling is annoying. However, I think the buttons should be spread out further so that you don't accidentally click the wrong one.
31	9+ hours	left arrow would move to previous post/reel, and the right arrow for next and the dragging time bar will ff/rewind	Unsure	N/A	Like: controls are exclusive
32	6 - 8 hours	Previous video (left facing arrow), Pause (pause symbol), Next video (Right facing arrow), Scrub through video (dot on the time line), Mute/unmute (speaker icon)	Yes	Wasn't sure if the arrow icons would rewind/fast forward or skip to the previous or next video	I do like the ability to scrub through a video. Sometimes I want to show someone a video and start from the beginning, but I have to scroll up and then back down to make it restart.
33	6 - 8 hours	rewind video by 5 seconds, pause, forward video by 5 seconds.	Yes	I am not really sure about the left arrow and right arrow.	Maybe include a place to indicate the time. Something like 1:03 / 2:00
34	1 - 2 hours	previous pause next	No	Industry standard	Makes sense
35	less than 1 hour	adjust video progress	Unsure	It's clear	I like it because I can control the pace
36	less than 1 hour	rewind, pause, forward	No	It looks clear for me.	It's simple and easy to use. No redundant functions.
37	1 - 2 hours	NA	Yes	NA	NA
38	less than 1 hour	go to the next image, go to the prior image, stop playback?	Yes	changing images and stopping playback seem unrelated.	I'm not sure what it is doing.
39	9+ hours	Left arrow for rewinding the video, middle button to play/pause, right arrow to fast forward. Slider at the bottom adjusts the volume	No	They're all clear and used consistently elsewhere so easy to infer	I like that all options are shown to the user, although maybe gesture usage could be better for some users, particularly expert users
40	6 - 8 hours	I think it is designed to pause/stop a video. Not sure about the arrows: would it	Yes	As I menationed earlier, I don't know what would happen if I	Overall, I like this feature, I think it is going to be useful.

		wind 10 secs?.. or will switch to a new video? But which one?		click on the left and right arrow, since different programs do different stuff: YouTube will start a new video, but Facebook will wind 10sec forward.	
41	1 - 2 hours	Go back to start, play, go to next	Yes	Does the left arrow icon take us to the previous video or the beginning of the current video?	Like: it's simple. Dislike: see response to #8.
42	less than 1 hour	I would predict you are either pausing the view of someone's story, going back a video on someone's story, or going forward a video on someone's story	Yes	Some people could thing the arrow keys mean rewind the current video in the story	I would bring the button to the right or left, so the user doesn't have to reach their thumb or other fingers as far
43	3 -5 hours	Pause pauses the video, back goes to the beginning of the video, next goes to the next user's video.	Yes	Because I'm not sure if the buttons advance to a different video or skip ahead or behind in the current video.	It borrows some affordances from many popular music apps with play pause fast forward and rewind. So those seem intuitive although I'm not sure how they will apply in this context but I would think I would learn quickly if I was using a working prototype
44	less than 1 hour	I think the middle button would pause the video. The left and right arrows would rewind and fastforward. The volume button would maybe toggle between muted or not? The circle and line adjust where you are in the video.	Yes	I am not sure whether the arrows adjust position in the video, or switch to other videos. Also not totally sure if the volume button would mute or bring up a slider to adjust the volume level.	I like that there is a clear way to control playback of the video and adjust the volume because these are definitely issues that I have with the current interface. For the most part the buttons are intuitive and consistent with other interfaces and they are designed so they are accessible but obvious also.
45	less than 1 hour	Pause, previous vid and next vid	No	based on the icon pictures	nothing
46	3 -5 hours	it would either stop, rewind, or fast forward the vidoe	No	n/a	its simple and intuitive, i dislike the colors of it
47	6 - 8 hours	Left arrow will go back to beginning of video, middle will pause, right arrow will fast forward or skip to end of video	No	I am able to understand what to do with out thinking too much.	Wireframe is good , only uncertainty is what the right arrow does
48	1 - 2 hours;3 -5 hours	It would either rewind, pause, or fast forward the video being played.	No	The icons are fairly common in video players.	I like that it offers the user more control in navigating through a video.

49	1 - 2 hours	control the video	No	it's used in other video software	N/A
50	3 -5 hours	last video, stop, next video	No	It's straightforward	add fast forward and rewind buttons

### 4.3 Card prototype



*Figure 2* — Card prototype. The screenshot on the left is the view during video playback. The video on the right represents the view after a user puts their phone or drops it. Once the user picks their phone back up they can either press the arrow on the left to rewind five seconds, resume the video by hitting the play button, or fast-forward five seconds.

### 4.4 Empirical Evaluation

The goal of the empirical evaluation is to determine if the new functionality introduced in the textual prototype (pause, rewind, fast-forward functions) improves the usability of the interface versus the current version of Instagram.

*Table 1*— Null hypothesis and alternative hypothesis.

H <sub>Null</sub>	Usability is the same between the original interface and the interface with added functionality.
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$H_{\text{Alternative}}$	Usability is significantly different between the original interface and the interface with added functionality.
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A between-subjects experiment will be conducted to avoid the practice or learning effect, as well as a fatigue effect (Mackenzie, 2013). Subjects will be randomly assigned to one of two groups. This can be done by assigning each subject a number and grouping the subjects into even and odd groups. Group one involves subjects using the current version of Instagram. Group two involves subjects using the interface described in the textual prototype (see appendix 6.1). The prototype used in this experiment will be of a higher fidelity. The independent variable is the interface type, original or prototype. This variable is independent of the subject's behavior. The dependent variable is the time it takes for the subjects to complete their treatments.

During the treatments, each subject will be asked to watch a two-minute tutorial on Instagram demonstrating how to create an origami figure for beginners. The video content will be identical for each subject group. Each subject will be asked to watch the video and follow the instructions. The subjects are free to pursue this task how they like; meaning, they can either watch the video first and then create their piece of origami, or they can attempt to watch the tutorial and prepare their origami simultaneously. Each subject will be timed, beginning once the tutorial starts to when they have created their origami.

The data generated from this experiment will be two lists for each group comprised of the individual subject's trial times. Below is a general example of what the results of the experiment would look like.

*Table 2*— Example of experiment results

Group	Average Trial Time	Standard Deviation
Group 1 (Original Interface)	X	A
Group 2 (Prototype)	Y	B

Based on the independent variable (categorical) and the type of data recorded (ratio), a student's T-test is an appropriate method to analyze the data and determine whether there is a significant difference between the two interfaces.

Recruiting subjects that have experience folding origami is one example of a lurking variable. Unintentionally recruiting an origami expert could bias the data and lead to a false positive or false negative (depending on what group they are placed in). Furthermore, the type of devices used for each treatment is a potential lurking variable. Using an older model smartphone for group 1 versus a newer model smartphone for group 2 could impact results if the older phone is slower. Similarly, using slow internet could impact the buffering speeds of the video content, resulting in longer trial times.