



# Interactions of Twitch Users and Their Usage Behavior

Daniel Gros<sup>(✉)</sup>, Anna Hackenholt, Piotr Zawadzki,  
and Brigitta Wanner

Department of Information Science, Heinrich Heine University Düsseldorf,  
Düsseldorf, Germany

{daniel.gros,anna.hackenholt,piotr.zawadzki,  
brigitta.wanner}@hhu.de

**Abstract.** In recent years social live streaming services (SLSSs) like YouNow or Periscope are becoming more and more popular. Within the gaming and E-sports industry, Twitch became one of the biggest live streaming platforms for video games in late 2014. This paper analyzes the usage behavior and interactions of Twitch users, especially their wish to get involved in a live-stream. The study is a quantitative analysis based on an online questionnaire, which was completed by 603 Twitch users. Both user groups, ‘viewers’ and ‘streamers’, participated in the study. Additionally, streamers with different popularity (follower size) were observed to get an insight of the interactions between Twitch users.

**Keywords:** Streaming · Social live streaming services · Twitch  
Media usage · Usage behavior · User interaction

## 1 Introduction

In recent years social live streaming services (SLSSs) like YouNow or Periscope are becoming more and more popular. Being able to broadcast your own content in real-time, interacting with your audience and the possibility of a gratification system are the main characteristics of an SLSS [1]. SLSSs are represented for different purposes, but particularly the streaming of video game content enjoys an enormous viewership [2].

In the gaming and E-sports industry, Twitch became one of the biggest live streaming platforms for video games in late 2014. Apparently, a substantial number of gamers prefer to watch video games on a live stream than playing the game themselves [3]. On Twitch, viewers can communicate with the streamer or other viewers via chat, while streamers are broadcasting a game or starting an “IRL” (In Real Life) stream to simply talk to the community. By talking with viewers on stream or raffle (mostly gaming related) prizes, the streamer creates an interactive community.

In 2016, Twitch had collectively 550,000 years-worth of video content, created by 2.2 million unique streamers [4]. Another feature of Twitch are donations and subscriptions, which are mostly used to support the streamer financially. However, some streamers are collecting money for different charities. More than \$25,300,000 were

raised for different charities in 2016 [4]. The popularity of Twitch has risen not only in the United States but also in Germany, as it is ranked on place 29 of the most visited websites in Germany<sup>1</sup>.

With growing usage of streaming platforms like Twitch, the motivation of this paper is to look closer at the reasons why and how Twitch is used in Germany and why some of the users spend money on it even though it is free of charge in general. Although Twitch is used so heavily by a huge number of users, research is still sparsely conducted. This paper will explore the motivation for using Twitch regarding the different application types to “watch” a stream.

In the following, related work regarding SLSSs and Twitch are presented (Sect. 2). Afterwards, an overview of the applied methods is given by presenting the developed research questions, the use of a questionnaire and the calculated statistical tests to substantiate the results (Sect. 3). Subsequently, the research questions are answered by analyzing the obtained data (Sect. 4). In conclusion, an evaluation of the findings and limitations are given (Sect. 5).

## 2 Related Work

Even before the SLSSs, social media services allowed users to both consume and produce content, creating a new kind of user. The so-called “prosumers” [5] form virtual communities, which usually pursue a common goal [6]. Unlike social media services such as Facebook, SLSSs are not asynchronous, but take place in real time [1]. SLSSs come in many different forms, but especially in the video game sector, thousands of spectators are cast in the spell [2]. There exist various subcategories in this subject area. Smith, Obrist and Wright [7] define three popular sub-categories: “eSports” (electronic sports), “speed running” and “Let’s Plays”.

An “ethnographic investigation of the live streaming of video games on Twitch”, is conducted by Hamilton et al. [8], finding that “Twitch streams act as virtual third places, in which informal communities emerge, socialize, and participate”. These virtual worlds are an example where “social and commercial realizations of an emergent streaming culture” are combined [9]. Even the gameplay of a single player game can be a social activity while streaming on Twitch [11].

Lessel et al. [10] investigated the influence of the audience on the gameplay in a stream by two different case studies and came to the conclusion, that “more influence options [for the audience] are appreciated and considered as important”. Another research about the live-streaming community shows the possibility of “predicting the number of chat messages based on the number of spectators” [12]. Also, research about the motivations of Twitch users exists. Sjöblom and Hamari [13] identify “tension release, social integrative and affective motivations” to have an increasing impact on the usage time on Twitch and that “social integrative motivations are the primary predictor of subscription behavior”.

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<sup>1</sup> [www.alexa.com/siteinfo/twitch.tv](http://www.alexa.com/siteinfo/twitch.tv) [Retrieved 02-05-2018].

Gros et al. [14] investigated the motivational factors to use Twitch based on the uses and gratifications theory by surveying German Twitch viewers in 2016. While test items regarding the entertainment factor as a motive are valued high, e.g. “*I use Twitch to follow tournaments and events*”, test items regarding socialization aspects become less important to most of the viewers, e.g. “... *to communicate with other viewers through the chat*”. However, the socialization factor becomes more important for viewers who spend more time or money on Twitch, reasoning its usage. This finding leads to the main motivational factor for this study, as one of the main motives “... *to get in touch with a streamer*” seem to be insignificant compared to other motives. How is the desire to get involved in a live-stream and the interaction between the streamer and its audience perceived?

### 3 Methods

To investigate the perceived involvement (desire) of Twitch users, the following research questions were developed:

- RQ1a: How strong is the desire for involvement and the actual involvement of Twitch users in a stream?
- RQ1b: How do socio-demographic factors (gender, age, education, profession), the time spent or the money spent on Twitch influence the desire for involvement in a stream?
- RQ1c: How does the usage behavior influence the desire for involvement in a stream?
- RQ2: How are the interactions between streamer and viewers perceived?

Based on these research questions, a research model was created to investigate the involvement desire of Twitch users on two different dimensions: interaction and usage behavior (Fig. 1).

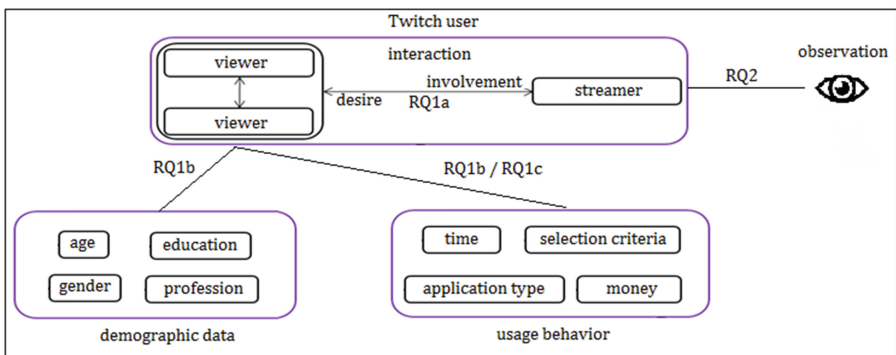


Fig. 1. Research model

Test subjects were surveyed through an online questionnaire, which contained in total 23 major items, in early 2016 (from December 30<sup>th</sup>, 2015 to February 15<sup>th</sup>, 2016). The target group were German-speaking Twitch users. This way an unequal distribution of participants from different countries was prevented. The questionnaire was spread via different social media networks, e.g. in Facebook groups, under gaming related hashtags on Twitter or on Reddit. Moreover, Twitch streamers were contacted and asked to spread the link to the questionnaire through the chat. A pretest with ten participants was performed. The time to fill in the questionnaire takes 10 to 15 min. In total, the survey consists of 23 items.

**RQ1a.** A five-point Likert scale is used to measure the test item regarding the involvement desire, “*It is important to me, that I get involved by the streamer.*”. The following answer options were given: “Strongly Disagree” (1), “Disagree” (2), “Undecided” (3), “Agree” (4) and “Strongly Agree” (5), while every option has the same distance on a scale of sentiments. In addition, participants were asked whether and how they got involved by a streamer, to test the actual involvement.

**RQ1b.** Do the socio-demographic factors (gender, age, education, profession) influence the desire for involvement in a stream? The age of the participants was divided into four different groups: teenagers ( $\leq 18$  years), younger adulthood (19–25 years), middle adulthood (26–35 years) and older adulthood ( $\geq 36$  years). Also, the usage time on Twitch and the willingness to financially support a streamer may be influential factors to the involvement desire. Therefore, the data is analyzed by the participants weekly average usage time on Twitch and whether a donation or subscription was made. Regarding the factor time, the participants were grouped into five groups depending on their average usage time per week:  $\leq 2$  h, 3–6 h, 7–12 h, 13–20 h and  $\geq 21$  h.

**RQ1c.** As a stream can be used in different ways, e.g. a viewer can watch or just listen to a stream, different application types could be possible influential factors. Furthermore, criteria regarding the selection of a stream may be relevant. Under what criteria do Twitch users choose a stream? Participants of the conducted survey had to choose from a list of possible ways to use Twitch and decide whether the game, the streamer (person) or the channel is relevant for the selection to watch a broadcast. The test items were rated on a five-point Likert scale and compared with the rating of the desire for involvement. Moreover, a regression is calculated to show which test items are reasoning the involvement desire.

**RQ2.** The findings are highlighted by an observation of the interactions between streamer and viewers. The selection of the streamers was based on a randomly generated list of 100 streamers. As the number of followers of the streamers diverge, three groups were classified: small ( $<3,000$ ), middle (3,000–14,999), large ( $\geq 15,000$ ). Eight streamers of each group were randomly selected for this observation, to identify differences among these groups. Overall, 24 streamers were observed in a period of four months in early 2016 in a total broadcasting time of ten hours. Each session lasted at least for an hour. A checklist was prepared to take notes for the concept of the stream (e.g. streaming schedule or advantages for subscriptions), the overlay and the observed interactions between streamer and viewers. Each broadcast was observed by two individuals.

The results of RQ1(a–c) were proven by various statistically applicable tests. As the data is not normally distributed, non-parametric tests have been used: Mann-Whitney U test [15], Kruskal-Wallis test [16], Pearson’s chi-squared test ( $\chi^2$ ), Dunn-Bonferroni test [17, 18]. To calculate the strength of a relation, the symmetric mass Phi ( $\phi$ ), Cramer’s V (CV) and the contingency coefficient (CC) are used. To measure the effect size of relations between variables in case of a significant difference, Cohen’s d ( $r_d$ ) was calculated and classified as weak ( $r_d \geq 0,1$ ), medium ( $r_d \geq 0,3$ ) or strong ( $r_d \geq 0,5$ ) [19].

## 4 Results

In total, 791 people were surveyed. The introductory questions intended to filter out participants who are acquainted with and use Twitch. While 695 (89.9%) answer to be familiar with the live-streaming platform, 603 (86.6%) are actively using it, out of which 470 (77.9%) use Twitch only as a ‘viewer’ and are not broadcasting content. The following results are focusing on Twitch spectators. As 133 (22.1%) participants consider themselves as ‘viewer and streamer’ (further labeled as ‘streamer’), the outcomes are analyzed separately and compared.

### 4.1 Involvement Desire and Actual Involvement

To answer RQ1a, “How is the involvement desire and the actual involvement of Twitch users perceived?”, the results of the corresponding test items “*It is important to me, that I get involved by the streamer.*”, “*Did you get involved by a streamer before?*” and “*How did you get involved by a streamer?*” are presented.

On the one hand, 50.4% ( $n = 67$ ) of the ‘streamers’ and 37% ( $n = 174$ ) of the ‘viewers’ agree with the statement, that it is important to them to get involved by a streamer. On the other hand, about one fifth of the ‘streamers’ (19.5%,  $n = 26$ ) and about a third of the ‘viewers’ (34%,  $n = 160$ ) disagree with the statement. The average ratings are 3.03 (‘viewer’) and 3.46 (‘streamer’).

To identify a significant difference between the two user groups ‘viewer’ ( $n = 470$ ) and ‘streamer’ ( $n = 133$ ), the middle ranks by means of the Mann-Whitney U test are calculated. ‘Viewers’ reach a middle rank of 288.67, whereas ‘streamer’ reach a value of 349.11. The higher value for ‘streamer’ indicate a stronger involvement desire. This outcome is significant ( $z = -3.628$ ;  $p < 0.001$ ). However, the effect size for this difference is classified as weak ( $r_d = 0,15$ ).

Regarding the actual involvement, 64% ( $n = 301$ ) of the ‘viewers’ and 89.5% ( $n = 119$ ) of the ‘streamers’ stated they got involved in a broadcast by a streamer before, which is a significant difference ( $\chi^2 = 32.152$ ;  $p < 0.001$ ). It seems ‘streamers’ are involved more often in a stream – or at least have the feeling of being involved in a stream. However, the relation is low ( $\phi = 0.231$ ,  $p < 0.001$ ; CV = 0.231;  $p < 0.001$ ).

At last, the different types of involvement are presented (Fig. 2).

The most common type of getting involved seems to get mentioned in a stream by the streamer, as 80.4% ( $n = 82$ ) of the ‘streamers’ and 52.1% ( $n = 245$ ) of the ‘viewers’ answered this option. Furthermore, being able to make a stream-related decision, e.g. choosing a hero, and participating in raffles are popular ways to involve

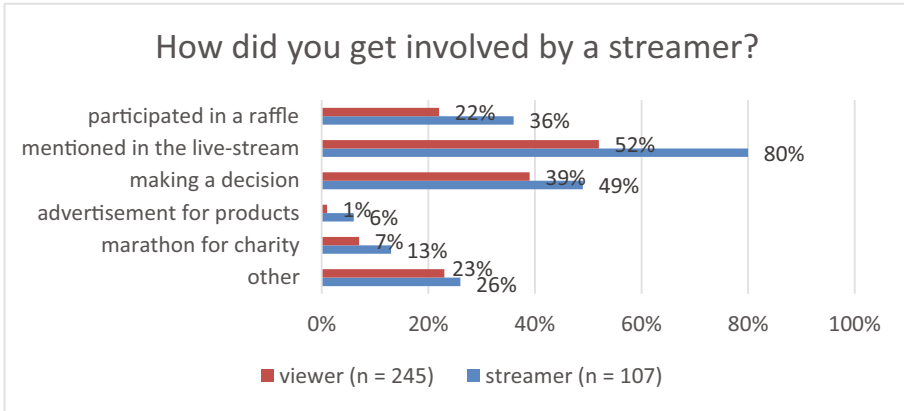


Fig. 2. Types of involvement.

the viewers, too. It is striking, that the group ‘streamer’ are more often involved by the given answer options. Participants who chose ‘other’ as an option (‘viewer’ = 23.2%, n = 57; ‘streamer’ = 26.1%, n = 28), stated viewer games as another type of involvement.

#### 4.2 Demographic Data

The gathered data is analyzed under different aspects of the demographic data and usage behavior, to answer RQ1b: “How do socio-demographic factors (gender, age, education, profession), the time spent, or the money spent on Twitch influence the desire for involvement in a stream?”. The following table gives an overview of the middle rank regarding the involvement desire (Table 1).

**Gender.** Regarding the gender, female ‘viewers’ have a stronger involvement desire (middle rank = 242.58) than males (middle rank = 234.78) and those who did not provide any information (middle rank = 154.13). However, the statistics of the Kruskal-Wallis test for the ‘viewer’ indicate no significant difference regarding the gender ( $\chi^2 = 1.769, p = 0.413$ ), as well as for ‘streamers’ ( $\chi^2 = 0.021, p = 0.883$ ).

**Age.** The biggest share of ‘viewers’ and ‘streamers’ are young adults between 19 and 25 years. In both cases the middle rank is highest for teenagers. Generally, the middle rank decreases by their age group. In conclusion, teenagers have a stronger involvement desire. Though, the results are not significant for the group of ‘streamers’ ( $p = 0.570$ ). As there exists a significant difference for ‘viewers’ ( $p < 0.001$ ), a post hoc analysis (Dunn-Bonferroni test) is conducted to identify which groups differ significantly from teenagers. It reveals that all three groups differentiate from teenagers, while the effect size shows partly a strong relevance: young adulthood ( $r_d = 0.27, p = 0.002$ ), middle adulthood ( $r_d = 0.53, p < 0.001$ ) and older adulthood ( $r_d = 0.64, p = 0.049$ ).

**Table 1.** Involvement desire on different aspects

	Demographic data	viewer		streamer	
		n = 470	Middle rank	n = 133	Middle rank
Gender	female	85	242.58	17	68.24
	male	381	234.78	116	66.82
	no information	4	154.13	–	–
Age	≤ 18 years	113	277.31	29	74.74
	19–25 years	235	237.25	65	66.78
	26–35 years	105	200.02	36	61.65
	≥ 36 years	17	152.47	3	61.00
Education	still at school	57	284.94	15	90.57
	Hauptschulabschluss (basic school education)	11	286.45	9	63.06
	Realschulabschluss (high school diploma)	66	232.56	25	78.74
	advanced technical college certificate	59	258.63	23	62.61
	European Baccalaureate	175	229.27	41	62.80
	Bachelor's degree	68	214.18	16	49.06
	Master's degree	25	164.54	3	33.00
Profession	unemployed	20	290.50	13	56.88
	pupil	93	265.41	18	89.22
	vocational training	39	272.13	14	80.00
	student	187	227.15	41	61.50
	part-time working	17	214.44	4	55.50
	full-time working	103	203.02	40	62.98
Time	0–2 h	152	210.69	21	55.40
	3–6 h	125	235.64	33	64.61
	7–12 h	81	245.98	30	70.52
	13–20 h	53	259.25	23	61.76
	≥ 21 h	59	263.41	26	79.98
Money	did spend money on Twitch	125	290.85	65	73.25
	did not spend money on Twitch	345	215.44	68	61.02

**Education.** Most of the participants have an European Baccalaureate ('viewer': 37.2%, n = 175; 'streamer': 30.8%, n = 41) as the highest educational attainment. 'Viewers' who have a high school diploma and those who are still in school have a higher middle rank than the other groups. Furthermore, it is noticeable that in general participants with educational qualifications attainable at a university (Bachelor, Master), have low middle ranks. This outcome is significant ( $\chi^2 = 27.812, p = 0.883$ ). In case of the 'streamers' similar results are given ( $\chi^2 = 17.426, p = 0.015$ ). The

subsequent post-hoc analysis for ‘viewers’ shows that only the education groups ‘Master’ and ‘still in school education’ differ significantly ( $z = 3.803$ ,  $p = 0.009$ ) with a medium effect size ( $r_d = 0.42$ ).

**Profession.** In this study, most of the participants of both groups are students, full-time working or pupils. The middle ranks for ‘viewers’ are between 203.02 (full-time working) and 290.50 (unemployed). A significant difference regarding the desire to be involved could be found for ‘viewers’ in different occupational situations ( $\chi^2 = 19.536$ ,  $p = 0.012$ ). However, the subsequent post hoc analysis reveals only a significant difference between pupils and full-time employees ( $p = 0.035$ ), with a weak effect size ( $r_d = 0.24$ ). In case of the ‘streamers’, where pupils have the highest middle rank (= 89.22), no significant difference could be found ( $\chi^2 = 12.715$ ,  $p = 0.079$ ).

**Time.** While the biggest share of ‘viewers’ use Twitch less than 3 h ( $n = 152$ , 32.3%) and between 3 and 6 h ( $n = 125$ , 26.6%) per week, the share of the ‘streamers’ is distributed evenly on the groups. For ‘viewers’, the middle rank increases as more time is spent on the platform ( $\chi^2 = 10.195$ ,  $p = 0.037$ ). This suggests that viewers who spend more time on Twitch most likely agree to the desire for involvement than those who spend less time on Twitch. The followed-up post hoc analysis could not find significant differences between the individual groups. Again, in case of the ‘streamers’ no significant difference could be found ( $\chi^2 = 6.034$ ,  $p = 0.197$ ).

**Money.** For both groups, the middle ranks are higher if a donation or subscription to a streamer has been made in the past. The difference of the values for the ‘viewers’ is 75.4 ( $z = -5.462$ ,  $p < 0.001$ ), while for the ‘streamers’ it is 12.23 ( $z = -1.890$ ,  $p = 0.059$ ). The identified significant difference for the viewers has a weak effect size ( $r_d = 0.25$ ).

### 4.3 Usage Behavior

To answer RQ1c, “How does the usage behavior influence the involvement (desire) of a Twitch user?”, Spearman’s rank correlation coefficient for different test items regarding the usage behavior and the involvement desire is calculated (Table 2).

On the one hand, the highest correlation for ‘viewers’ exists between the involvement desire and test item 5, to watch the broadcast and use the chat simultaneously ( $r_s = 0.476$ ,  $p < 0.001$ ). On the other hand, ‘streamers’ have a stronger involvement desire as they are using the chat while playing a game ( $r_s = 0.306$ ,  $p < 0.001$ ). These test items represent the anticipated use of Twitch for a regular viewer and streamer. Regarding the selection criteria of a stream (items 9, 10 and 11), for ‘streamers’ a significant correlation for test item 9 ( $r_s = 0.202$ ,  $p = 0.020$ ) and for ‘viewers’ for test item 11 ( $r_s = -0.094$ ,  $p = 0.042$ ) exists.

For the conduction of a regression, the test items 3, 5, 6, 7 and 10 were chosen as predictors in consideration of the correlations as well as the corresponding collinearity. The multiple correlation of the criterion with all predictors is 0.493 for ‘viewers’ and 0.392 for the ‘streamers’. Furthermore, the ‘viewers’ have a higher explanatory variance ( $R^2$ ) with 0.243 than the ‘streamers’ ( $R^2 = 0.154$ ), meaning 24.3% of the variance of the involvement desire of the ‘viewers’ can be explained by



**Table 2.** Correlations between involvement desire and usage behavior.

Test item	viewer $r_s$	streamer $r_s$
1: <i>I watch broadcasts of games that I personally play, too</i>	0.076	0.119
2: <i>I watch broadcasts of games that I personally do not play</i>	0.067	0.074
3: <i>I watch the broadcast and play games concurrent</i>	0.116**	-0.069
4: <i>I listen to the broadcast and play games concurrent</i>	0.107*	0.030
5: <i>I watch the broadcast and use the chat concurrent</i>	0.476***	0.264***
6: <i>I just use the chat</i>	0.189***	0.074
7: <i>I play games and use the chat concurrent</i>	0.253***	0.306***
8: <i>I just listen to the broadcast</i>	-0.018	0.051
9: <i>I choose the broadcast depending on the channel</i>	0.068	0.202*
10: <i>I choose the broadcast depending on the streamer</i>	0.083	0.137
11: <i>I choose the broadcast depending on the game</i>	-0.094*	-0.011

\*\*\* $p \leq 0,001$ ; \*\* $p \leq 0,01$ ; \* $p \leq 0,05$

these five predictors. In contrast, these predictors account for 15.4% of the variance of the ‘streamers’ involvement desire. The values of the Durbin-Watson statistics are 1.956 and 1.599 respectively, which speaks for no autocorrelation and independent error values.

#### 4.4 Interactions on Twitch

Supplementary to the conducted survey, the second research question (RQ2) “How are the interactions between streamer and viewers perceived?”, is answered by summarizing the results of the observation. While streamers with a different follower size were monitored, the results are restricted to streamers with a small (<3,000 followers), middle (3,000–14,999 followers) and large follower base ( $\geq 15,000$  followers). The observation put emphasis on the actions of a streamer to interact with his or her audience. In addition, the actions of viewers to interact with the streamer and other viewers are investigated. Besides, advantages of donations and subscriptions on Twitch will be analyzed.

It appears that all the observed streamers are offering their viewers the option for donations, which can be considered as interactions. A form of gratitude is generally expressed by mentioning the username, the amount of money and thanking the user for the financial support. Most streamers implemented a donation alert to fade-in an animation, insert text messages which are read aloud or play a short video on screen. It was noted, that none of the streamers offer an influence on the game play by a donation.

Another way to support a streamer financially, in case of a Twitch partner, is a subscription. Like donation alerts, most streamer implemented a subscription alert to highlight a new subscriber. It stands out that most of the streamers with a large (7 out of 8) and middle (6 out of 8) follower base offer benefits for subscribers. These benefits are in most instances channel-exclusive emoticons and to be able to have no restrictions regarding the chat, e.g. no slow-motion mode or a subscriber-only mode. Moreover, one

streamer (middle follower base) setup a TeamSpeak server to create a better network exclusively for subscribers. Less popular streamers (<3,000 followers) in this study were too unknown and therefore most of the test subjects of this group were not a Twitch partner.

Besides, it was striking that most of the streamers with a middle or large follower base, in contrast to smaller ones, advertised gaming-related products or channel-related merchandise in their stream.

During the observation, only a few of the streamers offered their audience to actively participate on the game, e.g. by organizing ‘viewer games’ and playing with or against a viewer.

Moreover, half of the streamers gave the audience a decision-making power. In most cases, the audience could decide which character should be picked. In terms of the chat, almost every streamer was actively referring to the content of the chat – regardless of his or her follower size.

The interactions between viewers through the chat were also observed. The content of the conversations was mostly referring to the broadcasted gameplay (e.g. questions about a specific gameplay) or the streamer (e.g. about his or her appearance). Even if not directed to the audience, viewers were mostly trying to help each other and answering questions of other viewers. This community feeling could be a reason for many users to greet and to say good bye to others. Furthermore, especially in the chat of streamers with a small follower base, some users were talking about personal experiences and plans, which, again, shows the community and socialization aspect of Twitch.

## 5 Discussion

In recent years, Twitch has become a huge platform for streaming video game related content with a high number of users. The community aspect could be a reason for the regular use and reasoning its consumption. As stated in Sect. 2, the findings of a previous study are the main motivational factor to investigate the involvement desire and interactions on Twitch.

While more than a fifth of the participants stated to be a ‘streamer and viewer’ (22.1%), the results for each research questions are compared with the data of the participants who are using Twitch only as a viewer (77.9%). The comparison shows that ‘streamers’ in general have a stronger desire for involvement than ‘viewers’.

*What are possible indicators for the involvement desire of ‘viewers’?* While the gender does not seem to play an important role, the age of the participants does. The ratings of teenagers ( $\leq 18$  years) regarding the involvement desire are significantly higher. Regarding the education, the results indicate that Twitch users who are still at school or have a high school diploma as the highest educational attainment are rating the involvement higher than users with a higher educational attainment (e.g. bachelor’s or master’s degree). Under consideration of the average weekly time spent on Twitch, a higher usage time leads to a stronger desire for involvement. Furthermore, participants who donated or subscribed to a streamer have a higher desire for involvement.

The analysis of the data given the socio-demographic factors as well as the factors time or money spent on Twitch could not reveal significant outcomes for ‘streamers’, except for the aspect ‘education’. A possible reason for the higher ratings could be the experience of a streamer. They know exactly the difficulties of starting a stream and reaching a worthwhile viewer- and followership. Broadcasting for a non-existent audience is not considered as entertaining and fun. Therefore, the involvement of the viewers by the streamer is important to create a community.

Another possible influence could be the different application types of how Twitch is used. While for ‘viewers’ the desire for involvement rises due to the agreement to the use of the chat while watching a live-stream, the ‘streamers’ desire increases while they play games and use the chat.

But, what types of interactions do exist? Donations and subscriptions are ways to support the streamer financially, which are highlighted by alert systems. While donations are gratified by the streamer, benefits for subscriptions are e.g. channel-specific emoticons or no limitations while a subscriber-only mode is active. A characteristic for most streamers with a middle (3,000–14,999) and large follower base ( $\geq 15,000$ ) was the advertisement for gaming related products. However, especially this feature is not considered as an involvement by participants of this study (Fig. 2). Moreover, the chat of streamers with a small follower base ( $< 3,000$ ) sometimes includes personal experiences and plans, which is probably not possible in chats with thousands of viewers. This speaks for the community and socialization aspect of streams.

**Limitations.** The developed questionnaire was only used on German-speaking Twitch users to prevent an uneven distribution among different countries. Though, it would be interesting to survey English-speaking Twitch users to compare the results and get a deeper insight on the usage behavior of Twitch users.

With a low participation rate of female Twitch users (16.9%,  $n = 102$ ), which appears unbalanced at first sight, this represents a realistic distribution of the gender in online game cultures [20, 21]. Moreover, the numbers of participants of some educational attainments and professions – e.g. state examination, PhD, federal voluntary service or retired – were too low to draw specific conclusions and thus are excluded in Table 1.

While there exist more application types of Twitch, which may differ from time to time, RQ1c does not represent a complete analysis of the usage behavior of Twitch users. However, an insight of the usage behavior is given for the used test items.

Although each test subject was observed for ten hours, the observation is only limited to 24 streamers with different follower sizes. Especially streamers with a slight followership were difficult to monitor for ten hours, as some had no streaming schedule. Furthermore, the classification of these groups may be suboptimal, as the aggregation of the popularity given by the follower size of a streamer is most likely not representing a list of all Twitch users. Thus, the results may not be sufficient to draw conclusions for ‘small’, ‘middle’ and ‘large’ sized streamers. Nevertheless, the results give an interesting insight of the interactions between Twitch users in general.

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