Enterprise Social Media Use in Classroom Team Project: A Mixed-Methods Exploration of the Effects of Affordances on Team Productivity and Use

Wietske Van Osch[1][2], Leticia Cherchiglia[2], Elisavet Averkiadi[2], and Yuyang Liang[1][2]

[1] Department of Information Technology, HEC Montréal, Montréal, Canada
[2] Department of Media and Information, Michigan State University, East Lansing, USA
vanosch@hec.ca
{leticia,averkiad,liangyuy}@msu.edu

Abstract. This paper explores the adoption of a group-based Enterprise Social Media (ESM) tool (i.e., Microsoft Teams) in the context of a mid-sized undergraduate course in Information and Technology Management (ITM), thereby providing insights into the use and design of tools for group-based learning settings. The study used a mixed-methods approach —interviews, surveys, and server-side (i.e., objective) data— to investigate the effects of three core ESM affordances (i.e., editability, persistence, and visibility) on students' perceptions of ESM functionality and efficiency, and in turn, on ESM-enabled perceived team productivity as well as the students' level of system usage. Through leveraging a combination of qualitative and quantitative (both unobtrusive and self-reported) data, this paper aims to provide insights into the use of ESMs in group-based classrooms which is a theme of great importance given the need for high-quality online education experiences, especially during the current pandemic.

Keywords: Enterprise social media, educational settings, group-based learning, mixed-methods, affordances.

1   Introduction

In recent years, there has been a rapid growth in Enterprise Social Media (ESM), which are web-based platforms adopted by organizations to improve internal communication, collaboration, interaction, and different aspects of workflow between coworkers (Leonardi et al., 2013). ESM are designed to be more multi-functional than traditional office tools (e.g., email) or even group-based communication tools (e.g., Slack) since not only are such functionalities included in ESMs, but they also provide novel features more aligned with social media (e.g., group creation, social networking, blogging); moreover, unlike previous forms of computer-mediated communication, ESMs allows users to broadcast messages within the organization and have all activities recorded to be accessed at any time (Chin et al., 2019; Leonardi et al., 2013; Van Osch et al., 2015). These unique ESM affordances, specifically in terms of making content and connections more visible, and allowing content to be persistent (i.e., remain available and accessible), help explain the transformative impact of ESMs in organizations.

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Pandemics such as COVID-19 (which forced organizations, including schools and universities, to rapidly shift to an online-only modus operandi) will increase the popularity of ESMs in both organizational and educational settings. When considering online learning contexts, ESMs can become suitable and preferable tools of choice especially when considering settings where group work can benefit substantially from ESM's unique affordances designed to facilitate collaboration and knowledge sharing (Rice et al., 2017; Treem & Leonardi, 2013).

In order to maximize the effectiveness of group-based learning, educators should consider not only factors leveraging team cognition, accountability, and classroom collaboration (He et al., 2007; Scott et al., 2016; Smart & Csapo, 2003), but also choose ESM platforms which are specially tailored to fulfill project-related purposes, such as Microsoft Teams[1]. Microsoft Teams is a fitting tool for educational contexts because it allows the creation of a virtual learning environment through the quick transition from conversations to content creation (Martin & Tapp, 2019). From both a design and an educational point of view, it is important to explore the affordances that Microsoft Teams has to offer, but more generally, how to improve ESMs to better fit group-based educational settings.

Therefore, the primary goal of this paper is to investigate the use and design of a group-based ESM (i.e., Microsoft Teams) as a collaboration system in learning settings. In order to do so, this paper aims to answer three overarching research questions: 1) if students' perceptions of ESM affordances affect their ESM interaction perceptions (RQ1); if these users' ESM interaction perceptions affect their perceptions of the ESM impact on team productivity and level of usage (RQ2); and if there are ESM-specific (here, Microsoft Teams) features which could be redesigned for improvement when considering their use in educational settings (RQ3). Based on findings from data collected from a mid-size undergraduate I.T. project management course - including surveys, appreciative interviews, and server-side (i.e., objective) usage data related to content creation within Microsoft Teams – we propose a model connecting ESM affordances, user perceptions of their interactions with the ESM, and the impact of the latter on perceived team productivity and actual ESM usage.

Results suggest that Microsoft Teams affordances can indeed positively impact perceptions of ESM functionality, ESM efficiency, and team productivity. Surprisingly, we found a negative impact of ESM interaction perceptions on the users' actual level of ESM usage, which seems to be largely explained by students' preferences for more familiar tools, but also reveal areas where Microsoft Teams could be improved to support the specified context of use, which will be explored in detail in this paper. Beyond implications for research in terms of extending ESM studies to the educational realm, our findings also lead to recommended improvements in ESM design to facilitate team communication, reinforcing the importance of user experience design.

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[1] https://www.microsoft.com/en-us/microsoft-365/microsoft-teams

2   Literature review

2.1   Collaboration Systems for Learning Settings

Virtual collaboration is an integral part of online learning settings, and group-based learning can yield more effective experiences given the increased frequency of communications and higher levels of participation, accountability, and decision making (Smart & Csapo, 2003), especially when dealing with complex projects involving high degrees of technical knowledge such as when managing I.T. projects (He et al., 2007). The adoption of an ESM in the classroom can help with the formation of team cognition and positive learning outcomes as ESMs have the potential to become "a persistent, private community that contains both time-bound, formal class groups in addition to open learning spaces that allow for community members to interact with each other without direction from a teacher, and yet the possibility for teaching presence to exist on some occasions" (Scott et al., 2016).

One ESM that has a great potential in educational contexts rooted in group-based settings is Microsoft Teams, a digital teamwork hub focused on team collaboration. Microsoft Teams offers communication functionalities (e.g., persistent chat, video calls, messaging capabilities) along with usage of the Office suite (e.g., Word, Excel, PowerPoint, OneNote) in a web-based integrated solution. Since its launch in 2017, Microsoft Teams has achieved 75 million daily active users, and it is now available in 53 languages across 181 markets (NTT Ltd., 2020; Warren, 2020). The pandemic was responsible for an overall increase of 70% in Microsoft Teams user base (Warren, 2020) as well as the expansion of the ESM to educational markets, including the development of new features to better assist online classes (Moorhead, 2020).

Microsoft Teams allows collaborative learning to be enacted around peer interaction (mediated or not by the instructor) which has the potential to boost team productivity in educational contexts. While the connection between usage of Microsoft Teams and increased productivity is well-known in organizational settings, we wonder how the ESM will be perceived by and impact students in educational settings. Research focusing specifically on the use of Microsoft Teams in classrooms is still very novel and mostly centered around a descriptive pedagogical approach (Martin & Tapp, 2019; Poston et al., 2020; Triyason et al., 2020), rather than investigating the measurable connections between variables such as ESM affordances, students' perceptions of the ESM tool, and usage outcomes, thus underscoring the importance of this study.

2.2   ESM Affordances

ESM affordances are unique and can have positive impacts in organizational settings; according to Treem and Leonardi (2013), core ESM affordances include: 1) association (i.e., connections are established from known people/information in order to find new people/information), 2) visibility (i.e., information is visible to other users), 3) persistence (i.e., past information is accessible and stored in a permanent fashion), and 4) editability (i.e., files are created collaboratively and/or edited after they have been created). Although alternative classifications have been suggested offering variations on

these four affordances, the above-mentioned framework is the most widely cited at the time of this manuscript's preparation and the one used to guide our model development.

Due to their affordances, ESMs have been adopted and utilized in organizational settings in order to improve workplace processes such as social capital formation, boundary work, attention allocation, and social analytics (Leonardi & Vaast, 2017; Van Osch et al., 2015). As ESMs' primary goal is to encourage collaboration and communication within the organization, these affordances are usually part of ESMs' inherent design making ESMs extremely useful tools to facilitate team dynamics. ESM research to date has focused largely on the visibility affordance, with limited research exploring the effects of the other affordances (Brzozowski, 2009; DiMicco et al, 2008). Furthermore, as aforementioned, the exploration of the effects of ESM affordances in an educational context represents a novel avenue of investigation using an affordance lens.

2.3   ESM Interaction Perceptions and Performance and Usage Outcomes

Specific ESMs' affordances have been studied in terms of their impact on communication and collaboration, knowledge transfer, improved job performance and efficiency, among other factors. ESMs can be especially useful when workers need to share complex and/or domain-specific knowledge (Pee, 2018) and ESMs can promote workers' creative performance (Sun et al., 2020), enhance communication and collaboration processes leading to improved workers' efficiency (Kane et al., 2014; Leonardi, 2014) and contribute to innovation in the workplace (Ali et al., 2015).

As mentioned before, literature exploring the use of Microsoft Teams in classroom settings is still in its infancy, but there are reasons to believe that ESM affordances can yield positive outcomes similar to those observed in organizational settings. It is important to note that, given the educational context of this particular study featuring only closed networks within the ESM (i.e., student groups using Microsoft Teams), the affordance of association (which highlights the active networking component of ESM) was neither relevant nor applicable. The other three affordances (visibility, persistence, and editability) are relevant because the highly collaborative nature of the group work performed in Microsoft Teams for the course (e.g., editing files together, discussing assignments) will most definitely trigger peer interaction and knowledge transfer.

Specifically, *visibility* enables users to effortlessly access information or browse content shared by others in the organization (Treem & Leonardi, 2013) and without hindrance (Alanah et al., 2009). As a result, visibility should not only contribute to perceptions of efficiency—as it will be easier and faster to find and retrieve information—but also to perceptions of functionality, by making it more convenient to access required knowledge and information and improving one's ability to accomplish tasks that require access to information provided by others (Treem & Leonardi, 2013), thus contributing positively to perceptions of functionality.

Similarly, *persistence* makes all information and content permanently recorded and allows users to use and reuse it in the future, thus further reinforcing the ability of users to access information freely and easily as initially enabled by the visibility affordance of ESM (Treem & Leonardi, 2013). Furthermore, persistence of information provides users with greater choice to deal with problems encountered during their course of work

or projects (Treem & Leonardi, 2013). Therefore, persistence not only increases efficiency, but should also positively affect perceptions of functionality, by making it more convenient to access required knowledge and information once shared without having to ask others again to repost or reshare such information and thus improving one's ability to accomplish tasks.

Finally, *editability* allows users to freely modify or revise content created by themselves or by others. Hence, it gives users the ability to improve or correct content. Furthermore, this high level of editorial control enables users to strategically edit or adapt content based on specific problem situations. Therefore, not only can projects be performed more efficiently by allowing users to collectively edit and improve materials, but also can contribute to positive perceptions of functionality by improving the usefulness and quality of generated content.
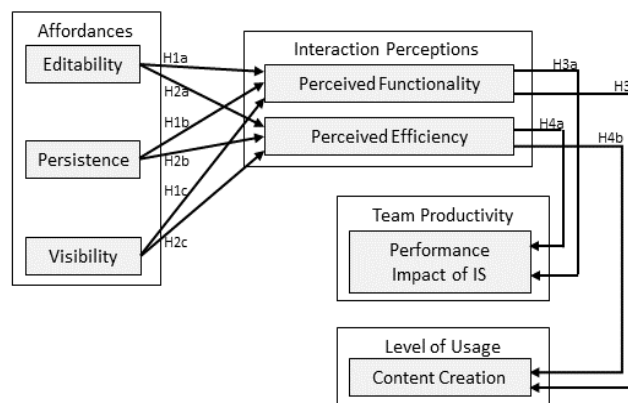
Hence, we propose the following hypotheses:

- **H1:** ESM affordances of a) editability, b) persistence, and c) visibility will lead to more favorable interaction perceptions vis-à-vis ESM functionality.
- **H2:** ESM affordances of a) editability, b) persistence, and c) visibility will lead to more favorable interaction perceptions vis-à-vis ESM efficiency.

In turn, the ability to successfully accomplish tasks using the ESM (i.e., functionality) and to do so efficiently should have a positive effect on teams' perceptions of the ESM's role in aiding the team to be productive and enhance their performance (i.e., the impact of ESM on performance). Furthermore, more favorable initial perceptions of ESM functionality and efficiency should yield greater overall usage of the system, as measured upon the conclusion of the project by the volume of total content created. Thus, the following hypotheses are proposed:

- **H3:** ESM perceived functionality will lead to (a) more favorable perceptions of ESM's impact on performance, and to (b) greater level of usage.
- **H4:** ESM perceived efficiency will lead to (a) more favorable perceptions of ESM's impact on performance, and to (b) greater level of usage.

The conceptual model in Figure 1 summarizes the constructs used in our study and our hypotheses:

Fig 1. Conceptual Model

3 Study context

This study was carried out at a large midwestern university, in the context of a capstone I.T. project management course attended by 87 students majoring in various areas (e.g., business-related: Finance, Supply Chain Management; technology-related: Media, Computer Science).

As a capstone project course, students participate in groups so as to further develop students' project management, teamwork, and communication skills, among others. Student teams were to complete a 10-week real-world I.T. project management challenge in partnership with local companies or organizations (e.g., non-profits or university labs). At the beginning of the course, 17 different I.T. projects were assigned to 17 teams, each comprising either four or five student members, based on project requirements, students' skills and interests. The primary point-of-contact within each project-sponsoring organization was known by student teams as "their client".

In order to support students' learning, ensure the use of proper project management tools and processes as well as monitor teams' progress in the real-world project, members of the instructional team (i.e., two instructors and two teaching assistants) were assigned to mentor and oversee specific projects. The mentor was known to the student team as their "project director" (one director per project; each director oversaw either four or five project teams).

The primary project management tool chosen to be used in the course was Microsoft Teams (free access was provided by the university). Specific team spaces (or channels) were created for each project (restricted to team members and their project director), in addition to one general course space (used for messages from the instructional team to all students enrolled in the course). Team spaces had mandatory uses such as communication with project directors, submission of a weekly project status to project directors, and organization of team files. Furthermore, optional uses of team spaces included within-team communication and file sharing with the client.

It is important to note that Microsoft has a version of Microsoft Teams tailored specifically toward education (Teams for Education), which showcases different features from the regular version. However, since Microsoft Teams was only meant to be used in the course as a place for mentoring and group interaction, the regular ESM version was used instead of Teams for Education.

4 Mixed methods

4.1 Design

Two rounds of voluntary online surveys were conducted to provide insights into how student teams collaborate, what drives such collaboration, and what is the role of Microsoft Teams in this context. Participants were offered 1% extra credit in the course and were entered in a raffle for one out of six $100 Amazon gift cards as an incentive to participate.

The first survey was administered at the start of the project, which preceded by two weeks the onset of the COVID-19 pandemic that forced all classroom interactions to become online-only. Hence, the first survey reflects students' perceptions at the beginning of their project (consisting of both in-person/online classroom interactions), while the second survey reflects perceptions at the end of the project (based on online-only classroom interactions). This allows us to explore whether the mandated virtual interactions impacted the nature and level of Microsoft Teams usage. In addition to collecting self-reported data via online surveys, we also extracted basic server-side (i.e., objective) data from Microsoft Teams in order to measure actual—as opposed to self-reported—usage level. Instructor access to server-side data was restricted to the amount of content created in teams' message boards, hence, no other server-side data could be extracted.

For the qualitative portion of this study, seven appreciative interviews were conducted to gain further insights regarding the use of ESMs in a classroom setting, specifically Microsoft Teams, as well as students' perceptions of group work, team collaboration, and team productivity. The appreciative interviewing method was chosen as it allows an exploration of organizational and technological ESM aspects, as well as individuals' positive changes and constructive feedback related to the use and design of ESMs (Avital et al., 2009; Schultze & Avital, 2011). Participants were offered $50 Amazon gift cards on a first come first served basis, as an incentive to participate.

Originally, interviews were planned to be conducted in-person, but due to COVID-19, interviews were conducted virtually via Zoom, an online video communications tool. Two interviewers were present in each interview; one member facilitated the interview while the other one took notes and focused on probing when needed. Interviews were conducted following a semi-structured script to ensure that interviews were conducted uniformly. All interviews were voice recorded via Zoom and transcribed with the aid of a paid online audio to text transcription service called Scribie. Interviews ranged from 45 minutes to one hour.

4.2   Participants

From the 87 students taking the I.T. capstone course, a sample of 62 students volunteered to participate in the study by completing the surveys. The sample included students from 16 different projects, categorized as: market/UX research (5), website (4), social media/SEO (3), database (2), or video (2). Most participants (71%) identified as male (female: 29%), and the age of participants ranged from 20 to 29 years old (M=21.87 years). Most participants (76%) were domestic students (international: 24%), and participants' ethnicity was distributed as follows: White/Caucasian (56%), Asian (35%), Hispanic/Latino (5%), Black/African American (3%). Most participants were seniors (87% vs. 13% for juniors) and business-related majors (77% vs. 23% for technology-related).

For the qualitative portion of this study, seven students (a sub-sample of the quantitative sample) were interviewed – see Table 1 below for a summary of participants' information (note: all names are pseudonyms).

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Table 1. Qualitative Data: Summary of Participants' Information

Name	Team Id.	Position	Gender
Edwin	Database1	Security Engineer	Male
Keith	SocialMedia1	Project Manager	Female
Tammy	SocialMedia1	SEO Campaign Director	Male
Liam	SEO1	Project Manager	Male
Sarah	Research1	Project Manager	Female
Jacob	Video1	Project Manager	Male
Dalton	Research2	Project Designer	Male

4.3 Measures

The survey included self-report measures that were adopted and adapted from existing research as summarized in Table 2. Although the table only reports the Cronbach's alpha (α) and convergent validity (AVE), all constructs in the model displayed adequate reliability as well as convergent and discriminant validity per an examination of loadings, cross-loadings, Cronbach's alpha, Composite Reliability, Fornell-Larcker test, and latent variable correlations. The last variable included in our research model was extracted from Microsoft Teams thus statistics are not available and therefore not reported.

The interview protocol started out by asking students to describe their project and to think of a positive collaboration experience they had with their team, in line with the appreciative interviewing method. After this opportunity for a positive reflection on teamwork, interviewees were asked questions related to Microsoft Teams use cases and affordances, their perception of its impact on team productivity, and the level of its usage.

Table 2. Variables and Variable Statistics

Variable	Example Item	α	AVE
Editability (Rice et al., 2017)	"Microsoft Teams allows me to edit others' information after they have posted it."	0.86	0.77
Persistence (Rice at al., 2017)	"Microsoft Teams allows my information or comments to stay available after I post them."	0.92	0.93
Visibility (Rice et al, 2017)	"Microsoft Teams allows me to see other people's answers to other people's questions"	0.89	0.81
Perceived Functionality (Mithas et al., 2006)	"Please rate the usefulness of the services provided on Microsoft Teams"	0.86	0.88
Perceived Efficiency (Bruni, 2004)	"Using Microsoft Teams is fast"	0.95	0.87
Performance Impact of IS (Goodhue, 1995)	"Microsoft Teams has a large, positive impact on my productivity in the team"	0.94	0.95
Content Creation [Microsoft Teams' data]	# of messages posted by each individual on their teams' message board	N/A	N/A

5 Results

5.1 Quantitative Model Findings

Overall, our results suggest that two affordances (namely persistence and visibility) had significant positive effects on perceptions of Microsoft Teams in terms of its functionality (H1b and H1c supported) and efficiency (H2b and H2c supported). The affordance of editability only showed a positive effect on perceptions of functionality (H1a supported), but not on perceptions of efficiency (H2a not supported). In turn, perceptions of functionality and efficiency had a significant positive effect on perceptions of team productivity as a result of Microsoft Teams (i.e., performance impact of IS – H3a and H3b supported). Furthermore, the paths from the perceptions of the interaction with Microsoft Teams (functionality and efficiency) to objective usage levels (in terms of content creation) were both significant, however, whereas the path from functionality was positive (H4a supported), the one for efficiency was negative (H4b not supported). See Table 3 for detailed statistical information related to these results.

It is worth mentioning that pre-post comparison analysis between all variables of interest were performed to assess if there was any significant impact due to the required transition to a fully virtual modus of operandi due to COVID-19, but no significant paths were found. Therefore, rather than focusing on whether there was a change in students' perceptions due to the pandemic, our findings are generalizable and reflect students' perceptions at large. Our quantitative findings will be further discussed in the discussion section together with findings from the qualitative data (interviews).

Table 3. Significant Path Model Results

Path	Coeff.	S.E.	R2
Editability > Perceived Functionality	0.26**	0.10	
Persistence > Perceived Functionality	0.23*	0.10	0.48
Visibility > Perceived Functionality	0.32***	0.09	
Persistence > Perceived Efficiency	0.44***	0.11	0.42
Visibility > Perceived Efficiency	0.22*	0.10	
Perceived Functionality > Content Creation	0.31**	0.12	0.07
Perceived Efficiency > Content Creation	-0.34**	0.12	
Perceived Functionality > Performance Impact of IS	0.63***	0.08	0.59
Perceived Efficiency > Performance Impact of IS	0.18*	0.08	

5.2 Qualitative Findings: Microsoft Teams affordances and interaction perceptions

Interview findings support survey findings and underscore that users of Microsoft Teams recognize the affordances of visibility, persistence, and editability, as illustrated by the example quotes in Table 4 below.

Table 4. Qualitative Data: Microsoft Teams affordances

Participant's Quotes: Visibility	Name
"If we want to update each other, we just put a message on the message board allowing everyone to see it"	Keith
"It's easy to have a posting and tag the whole team, you can tag individual members to look at certain stuff"	Sarah
"If someone is working on Microsoft Teams, I'm gonna get that notification"	Liam
Participant's Quotes: Persistence	**Name**
"you could open up Microsoft Teams when you want to reply to that message"	Jacob
"(a team member) was taking some notes so now we have that chat, it has the time stamp on it"	Devon
"when I'm on my phone, I can just click the files tab and pull up anything"	Edwin
Participant's Quotes: Editability	**Name**
"If you needed to edit a document really fast, you could easily make that change"	Sarah
"It's just really easy to upload, edit and work on things all at the same time"	Liam
"We use a lot of the files 'cause it allows you to work on files at the same time"	Keith

Additionally, interviews provided detail by highlighting optimal use-cases for the ESM. For example, interviewees reported that Microsoft Teams is best suited for team projects (57%; n=4) and quick communication settings (43%; n=3) given its ease of use related to file sharing/editing and messaging features - see Table 5. One interviewee (Keith) even mentioned class settings as being an optimal use for the ESM: "*I think the message boards, allowing everyone to be able to see a message, to keep up-to-date with what's going on in a class setting, that's really helpful*". In contrast, interviewees considered Microsoft Teams not optimized for social media (29%; n=2), heavy storage setting (29%; n=2), and video communication (29%; n=2); these perceptions were consequent of using an ESM in an educational setting composed of closed networks yet lacking social networking features, experienced issues when uploading large files (e.g., Sarah: "*it like pretty much just shut down the whole app*") and when performing video calls (e.g., Keith: "*I prefer Zoom just because it allows everyone to be up on the screen at the same time, on Microsoft Teams you can only see four people at a time. I've also noticed some lagging*").

Table 5. Qualitative Data: Microsoft Teams use cases

Featured used in Microsoft Teams	# mentions (%)
File sharing	4 (57%)
Chat	3 (43%)
File editing	3 (43%)
Message board	3 (43%)
File storage/organization	2 (29%)
Video calls	2 (29%)

Use-cases Microsoft Teams is best suited for (i.e., features viewed as positive)	# mentions (%)
Team projects	4 (57%)
Quick communication setting	3 (43%)
Highly collaborative setting	2 (29%)
Workplace/professional setting	2 (29%)
Class setting	1 (14%)
Use-cases Microsoft Teams is not suited for (i.e., features viewed as negative)	**# mentions (%)**
Heavy storage setting	2 (29%)
Social media	2 (29%)
Video communication	2 (29%)
E-commerce	1 (14%)

In regard to perceived efficiency (H2), overall, interviewees deemed Microsoft Teams effective due to features such as built-in communication tools (e.g., tagging/direct mentions, video, chat) and file organization/ storage – see Table 6. For example, Liam said that "*I think it's pretty effective that the instructors can have messages with everyone to let everyone know what's going on, but they can also send you individual messages, or messages to your whole group. They can also see anything that you upload immediately*", and Keith said that "*It's allowed us to basically stay in touch, and just all have access to the same information at the same time, and just basically be able to store everything that we're working on, so we don't have to worry about sending it*". Interestingly, some of these features are identical to those mentioned by others as not ideal, highlighting that the experiences may be highly dependent on the individual's user experience.

However, most interviewees mentioned that the user interface should be improved in order to make it more effective in team project settings. For example, Dalton highlighted design issues with both the ability to make calls ("*I know there's the Call function, but with like Discord it's a one-click thing, and [on Teams] it's on the tab of our specific project or whatever*") and to get notifications ("*I'm just gonna compare it to GroupMe. It's easy to see notification settings and I think it's better formulated, to where the messages are a little more cleanly played, whereas if I open up my Microsoft Teams chat, I see a bunch of stuff that isn't really applying to me*"), Tammy mentioned visual design issues with the file system ("*I don't really like the organization or how they look [files system]*"), and Edwin brought up that "*archiving and searching through old messages is typically really difficult*". Other interviewees mentioned formatting issues/ glitches (e.g., Tammy: "*I have had issues with trying to edit names and move files to folders, it's hard to do*") and connectivity issues (e.g., Sarah: "*I had a lot of instances where it would just crash on me a lot when I'd been uploading things on it. And a lot of the team members had similar experiences with that*"). Although it is unclear if these issues were only isolated cases or not (which might help explain the lack of significant path connecting editability with perceived efficiency as in H2a), interviews provide valuable insights into the perception of efficiency or lack of efficiency in Microsoft Teams.

Table 6. Qualitative Data: Microsoft Teams effectiveness

What makes Microsoft Teams effective	# mentions (%)
Built-in communication tools	3 (43%)
File organization/storage	2 (29%)
OS/device/platform independent	1 (14%)
File editing via Microsoft Office	1 (14%)
Project coordination/collaboration tools	1 (14%)
User-friendly	1 (14%)
Features that could make it more effective	**# mentions (%)**
Improved user-interface	5 (71%)
Fixed formatting issues/glitches	2 (29%)
Less connectivity issues	2 (29%)
Assign roles to team members	1 (14%)
Improved adding members functionality	1 (14%)
Pinning messages to message board	1 (14%)
Video chat function while editing files	1 (14%)

5.3 Qualitative Findings: Microsoft Teams impact on team productivity and Microsoft Teams level of usage

Supporting the quantitative findings related to H3, Microsoft Teams was perceived as a tool able to foster team productivity by most interviewees based on its perceived functionality and efficiency (71%; n=5). Interviewees mentioned the fact that Microsoft Teams can be considered an "*all-encompassing collaboration platform*" (Edwin) since it seamlessly integrates traditional office programs in one single collaborative space, easy to be accessed by the whole group during their classroom project, as pointed out by Keith: "*you can edit Word documents together, Excel documents. We've used One-Note once or twice, PowerPoint for all of our weekly memos we use. I think two of our team members actually built the Gantt Chart off of Microsoft Teams*". Such features helped to increase team organization, collaboration, and productivity, as mentioned by a couple of different interviewees; for example: Sarah said that "*it helped us to collaborate more 'cause it was all just like a central location where all of our documents were, so we didn't have to look at several different emails*" and Liam said that "*It's just so easy to work on things together. I can't think of a better platform that I've used so far to work on things with people*".

Casting a light into the contradictory quantitative findings for H4 related to ESM level of usage, it seems that although Microsoft Teams was the primary communication tool used when interacting with project directors, the ESM was not frequently or primarily used for team communication, and teams preferred to use the ESM only in desktop mode (see Table 7).

Table 7. Qualitative Data: Microsoft Teams level of usage

Frequent team communication on Microsoft Teams	# mentions (%)
No	4 (57%)
Uncertain	2 (29%)
Yes	1 (14%)
Team preference for Microsoft Teams platform use	**# mentions (%)**
Only desktop	3 (43%)
Both desktop and mobile app	2 (29%)
Unsure/did not answer	2 (29%)
Primary communication tools used	**# mentions (%)**
With the Project Director	
Microsoft Teams	7 (100%)
Email; Zoom	1 (14%)
With the Client	
Email	6 (86%)
Zoom/Skype/WebEx	5 (71%)
With team members	
GroupMe/iMessage	6 (86%)
Zoom	5 (71%)

Additionally, as the project progressed requiring more complex team collaborations, and as communication became solely online due to the pandemic, some project managers realized they should have enforced the use of Microsoft Teams for team communication and group work since the beginning. When asked what they would do differently if they could start over, Jacob said "*I would definitely use Microsoft Teams more. I think it would've been great for communicating with our team rather than doing a group message*", and Liam said "*We probably would have taken advantage of Microsoft Teams a little bit more at the start when we first were introduced to it at the beginning of the semester. We were like, oh, (...) we'll just use Google Docs or something else. But then we realized its potential and the things that you could do with Microsoft Teams*".

6   Discussion

This study, via a mixed-method approach, aimed to explore the effects of ESM affordances on perceptions of functionality and efficiency, and in turn on perceptions of the performance impact of ESM and actual ESM usage. We constructed a model rooted in our expectations that ESM affordances will lead to greater interaction perceptions (H1, H2), which in turn will positively affect team productivity and level of usage of the ESM (H3, H4). Our research model was validated using quantitative analyses of

survey data and qualitative interviews served to add depth and explain the quantitative results.

Overall, our findings suggest that Microsoft Teams contains three core affordances of ESMs, namely editability, persistence, and visibility, allowing the ESM to serve its intended goal of assisting team projects by enhancing collaboration primality via file sharing/editing and messaging features. Still, we saw differences between the impact of such affordances on ESM interaction perceptions. It seems that persistence and visibility tend to have positive effects on users' perceptions of Microsoft Teams as a functional, useful, easy to use, and efficient tool. After all, being able to store, access and see information posted by members and their peers in an efficient and reliable way is a pivotal part of teamwork. Both affordances are also extremely important in classroom settings when considering instructor-to-students' announcements in message boards or tagging/notifying specific students/their teams in order to bring attention to specific matters.

Unexpectedly, the affordance of editability was only significantly and positively connected to Microsoft Teams' perceived functionality (i.e., not to perceived efficiency), perhaps because even though editing is possible and perceived as a useful functionality, some students more than others might have experienced issues when editing files collaboratively (e.g., connectivity or formatting glitches, system crash when uploading large files, difficulty of searching though old messages, non-intuitive file system organization and appearance), thereby undermining the anticipated effect on perceived efficiency.

Regardless, participants interaction perceptions of functionality and efficiency were both positively connected with team productivity, a finding strongly supported by interviews. It seems that ESM tools, such as Microsoft Teams, can indeed boost team performance, given, for example: 1) their ability to serve as a central shared hub thus saving teams' time in storing, organizing, and searching for files; 2) the integration with applications (such as Microsoft Office) facilitating the usage of editing tools collaboratively; and 3) availability of built-in communication tools.

Ironically though, based on our findings it seems that students' teams did not take full advantage of such communication tools for team communication. Because the only mandatory use of Microsoft Teams was for turning in weekly course deliverables, organizing team files, and interacting with their project directors, instead of learning how to use the ESM to facilitate team communication, students preferred to use tools they were already familiar with such as GroupMe/ iMessage (messaging) or Zoom (video). Such finding is consistence with findings in organizational settings (Van Osch et al., 2015). It seems that given the plethora of competing tools providing solutions for team communication, teams do not utilize the ESM built-in chat/video feature but rather conform to their own preferences by choosing tools the team is already comfortable with, or tools that were specifically designed to afford seamless/optimal communication thus perceived as more efficient than the novel ESM and associated with lower switching costs.

This observation might be even stronger in educational settings given the younger user sample (i.e., undergraduate generation Z students) who seems to be more likely to value communication tools (even in educational settings) which are mobile-based,

popular, and afford quick-exchange of messages (McGrath, 2019). Based on our interviews, it seems that many teams preferred to use the desktop version of Microsoft Teams (as opposed to the mobile version), making the ESM not as pervasive and easily available as other messaging tools. The reasons behind such decision are unknown thus one limitation of this study, but perhaps students wanted to keep the classroom environment separated from their personal lives, or they thought that installing the Microsoft Teams app on their phones was too invasive.

Still, our model suggests that although perceived functionality is indeed positively connected with level of usage (measured by content creation in Microsoft Teams), perceived efficiency was actually negatively connected with such measure. Perhaps this is due to the fact that interviews highlighted issues with editability, which although not confirmed by survey data might have led to more negative perceptions of efficiency, which in turn undermined the level of usage. Moreover, content creation was objectively measured based on numbers of posts and replies posted on the message board, which does not account for messages exchanged privately via chats between the team, which is another limitation of this study. Future studies should further explore the role of team communication in team productivity and collaboration, invest in using more ESM server-side (objective) data (such as private group chats data) as objective measures supporting findings from self-reported data, explore differences between team/ individual knowledge building and how the ESM can facilitate or hinder those learning processes.

Our theoretical contributions are related to the impact that ESM affordances have on users' interaction perceptions, and the impact of users' interaction perceptions on team and system outcomes. By applying traditional organizational-based constructs in the context of group-based online learning, we aim to contribute to the growing body of literature exploring the use of social information systems in educational settings, a promising opportunity to create a better understanding of the impact of ESMs affordances and their effects in novel contexts.

From a strategic and practical point of view, our findings revealed several challenges for the use of Microsoft Teams, and perhaps ESM at large, in educational settings, which can be a starting point for designers in improving the design of such tools to provide better support for educational contexts.

6.1 Challenge 1

As the demand for online education grows, collaborative tools such as ESMs should strive to provide seamless experiences for multiple-user access to files and messages. In Microsoft Teams, it seems that both file editing/organization and messaging features could be improved as issues occurred when team members were trying to synchronously collaborate in editing files, upload files into the team shared space (especially for larger files), and search content in old messages. In group-based educational context, such features are of the upmost importance otherwise group collaboration (and therefore learning) will most likely be negatively affected.

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6.2   Challenge 2

Microsoft Teams (and other group-based ESMs) should improve its visual design in order to increase ease of use, user familiarity, and intuitiveness. After all, it seems that in Microsoft Teams some functionalities are not particularly visually appealing, reinforcing existing research that emphasized the importance of aesthetics and hedonic considerations in user experience and which has shown that 'unpleasant' design will lead to low levels of system use and continued use (Coursaris & Van Osch, 2016). Perhaps the ability to customize the platform/app by allowing the customization of the design theme of the interface (e.g., color palettes or object metaphors) would provide users with an experience better tailored to their liking.

6.3   Challenge 3

Microsoft Teams appears to have an issue with learnability; i.e., students did not want to bother learning something new as the user experience was significantly different from what they were accustomed to from other software, which seems partially related to the fact that some features are hidden or take extra steps/clicks to be accessed, thus undermining their use. Hence, a clearer and more intuitive understanding of all available features is needed, thus both decreasing the learning curve associated with using the ESM and increasing efficiency. Perhaps the ability to customize the platform/app by allowing the customization or prioritization of features based on use preferences could help overcome some of the issues with learnability.

6.4   Challenge 4

Team communication is a complex study topic which should be further studied since providing students with choices for team communication, although a traditional practice in educational settings, might be a setback when instructors are utilizing an ESM which already provides communication features. Given the choice, students will fall upon familiar tools therefore undermining the full potential for team collaboration through the ESM. However, some identified design issues with Microsoft Teams such as lack of specific video features and connectivity unreliability could have prevented an efficient team communication via the ESM since the beginning of the project no matter what. Interestingly, recently Microsoft has fixed one video issue mentioned by our participants (i.e., only having four video call participants in the screen at a time), which received positive feedback, reinforcing the significance of our findings.

Finally, beyond implications for the design of ESM tools to improve their usage in educational settings, the findings also point to a challenge that will be increasingly pertinent for organizations today, which is how to get users to adopt and use voluntary tools. As usage of ESM tools in organizations is typically not mandated, this problem seems to be particularly likely in regard to such tools. For many organizations, ESM tools were implemented given their platform functionality and thus their potential to act as an umbrella tool where all kinds of mediated activities and communications can co-occur therewith allowing to break down knowledge silos (Van Osch et al. 2015;

2018). However, in an era where people are increasingly allowed to bring their own devices to work (BYOD) and/or install software of their choice on corporate devices, the tendency of users to stick to what they are familiar with or prefer could pose real challenges for a high rate of adoption among employees and in turn, significant challenges from a knowledge management and intellectual property perspective (Van Osch et al., 2015).

7   Concluding remarks

ESMs and other collaborative platforms have been experiencing a drastic growth recently in order to facilitate the high demand for online learning and team collaboration tools. Even though such tools have the potential of bringing educational benefits in group-based settings, some improvements in design features are much needed to enable users with a full boost in team communication and productivity. Through a mixed-methods approach, our findings explore the uses and design of Microsoft Teams for educational contexts. We expect that this paper can provide insights for educators faced with the choice for an ESM tool best-suited for group-based classroom settings, as well as designers interested in adapting ESMs to educational contexts, a promising avenue for market expansion.

Acknowledgements

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