Chatbots and Financial Literacy

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Abstract

This exploratory research analyzes the impacts of chatbots that were created for the purpose of supporting and informing financial decisions. Previous research discusses the impacts of chatbots that were created to support and inform financial decisions in the financial service industry. This research takes a different approach by also analyzing the impacts of chatbots that were created to support and inform financial decisions both inside and outside higher education too. To assess the impact of the use of chatbots created for the purpose of supporting and informing financial decisions, I analyzed secondary data from thirty three sources. The analyzed sources suggested that chatbots were able to productively support and inform financial decisions. The sources also suggested that while chatbot technology is increasing its capability to better communicate with humans, the use of human interaction and assistance are still valuable. These findings suggest that while chatbots will continue to productively support and inform financial decisions, they will not replace the value human interaction can provide.

Introduction/ Background

This introduction and background will give insights on the importance of this research and will provide an understanding about chatbots. This research matters because there is a large population of people who lack financial literacy and correspondingly make adverse financial decisions, and this can negatively affect the economy. Accordingly, if chatbots can help support and inform financial decisions then chatbots can help provide a solution that will benefit a large population. In order to break down this concept I will explain financial literacy and I will explain the importance of financial literacy on both individuals and the economy. I will also explain current methods for supporting and informing financial literacy and financial decisions. Additionally, I will define chatbots, discuss chatbot system processes, and elaborate on chatbot design techniques. Lastly, I will discuss chatbots' strengths, opportunities, weaknesses, and risk. Thus, this introduction and background will give insights on the importance of this research and will provide an understanding about chatbots.

Financial Literacy

Before discussing why financial literacy is important, I will provide a foundation on what financial literacy means. Financial literacy provides people with the ability to make well informed decisions relating to financial management (Klapper et. al., 2016, p.4). Examples of financial management decisions can include saving, investing, borrowing, and more. Additionally, to properly make informed financial management decisions one must have the knowledge dimension and the application dimension to financial literacy (Huston, 2010). The knowledge dimension refers to understanding personal finance concepts and products, which can be attained through education and/or experience (Houston, 2010). The application

dimension refers to the “ability and confidence to effectively apply or use knowledge related to personal finance concepts and products” (Huston, 2010).

Financial Literacy’s Importance on Individuals

A lack of financial literacy affects one’s financial well-being and expected lifetime utility from consumption (Huston, 2010). For example, people with strong financial skills do a better job planning and saving for retirement and are more likely to diversify risk by spreading funds across several ventures (Klapper et. al., 2016, p.4). On the other hand, people with a lack of financial literacy are more likely to make financial mistakes that can negatively impact their individual's welfare (Huston, 2010). To elaborate, statistics show consumers with a lack of financial literacy, “spend more on transaction fees, run up bigger debts, and incur higher interest rates on loans” (Klapper et. al., 2016, p.4). Additionally, those with less financial literacy are more likely to fall prey to financial scams (Lusardi & Mitchell, 2013, p.23). Thus, it is worthwhile to see if chatbots can support and inform financial decisions due to financial literacy’s importance on individuals.

Financial Literacy Importance on the Economy

On a macro level enhancing financial literacy and financial information is important because financial literacy rates affect the United States economy. For example, a lack of financial literacy amongst economic participants can lead to negative consequences such as, “exacerbated business cycles, further inequality in the distribution of income and wealth, and inadequate savings for retirement” (Mandell & Klein, 2009, p.16). Other negative consequences of low financial literacy rates include low savings rates and capital formation, a weakening in the

value of the dollar, and inflation for economic participants (Mandell & Klein, 2009, p.16). Thus, a lack of financial literacy in economic participants can lead to negative outcomes on the entire economy (Mandell & Klein, 2009, p.16).

Existing methods to support Financial Literacy and Decisions

This section attempts to show what is already being done to help support and inform financial literacy and decisions.

Financial Literacy and Educational Courses

Financial educational course efforts have been made to improve financial literacy and financial decision making in the United States, however their efficiencies are questionable. For example, according to "Visual Tools and Narratives: New Ways to Improve Financial Literacy", recruiting individuals to educational seminars is difficult and costly to scale up (Lusardi, et. al, 2014, p.3). Furthermore, research shows, consumers who need the most help are the least likely, "to seek various types of counseling" (Lusardi, et. al, 2014, p.3). Additionally, according to 2007 data from the National Council on Economic Education (NCEE), "40 states had personal finance standards or guidelines and 28 states implemented these standards" (Mandell & Klein, 2009, p.16). Furthermore, "9 states required a course with personal finance content, 7 states required students to take a personal financial management course, and 9 states tested personal finance knowledge" (Mandell & Klein, 2009, p.16). As so, The Journal of Financial Counseling and Planning conducted a research study to show the impact of financial education courses on financial literacy (Mandell & Klein, 2009, p.18). Mandell's & Klein's findings indicated that those who took financial courses in high school were no more financially literate than those who

had not (Mandell & Klein, 2009, p.15). Additionally Mandell's & Klein's research indicated that, "those who took the course did not evaluate themselves to be more savings-oriented and did not appear to have better financial behavior than those who had not taken the course" (Mandell & Klein, 2009, p.15). Thus, educational courses efforts that teach financial literacy have been questionable in their effectiveness and this leaves room for other opportunities to help enhance financial decision making.

Other Existing Methods for Teaching Financial Literacy

Although financial literacy courses have been questionable in effectiveness, recommendations of effective approaches to teaching financial literacy have been researched. Recommendations of teaching methods that are interactive, relevant, and fun rather than those that are purely didactic are suggested to be effective (Mandell & Klein, 2009, p.23). Furthermore, aspects of easy access, quick, efficient, and low time commitment requirements in educational materials are also recommended (Lusardi et. al., 2014, p.3). Chatbots can mimic aspects of the recommended approaches to teaching financial literacy. For example, chatbots can incorporate interactions, relevance, and fun aspects with its communication ability. Additionally, chatbots can provide instant messages to everyday devices, making access to information easily and efficiently while also providing the convenience of low time commitment. Thus, chatbots can mimic aspects of the recommended approaches to teaching financial literacy and this makes them worthy of investigating their impacts on financial decision making

Chatbots

Chatbot system processes

Since chatbots are a big part of this research, it is important to introduce what chatbots are and how they communicate messages. Chatbots are computer programs that can communicate with users in human-like ways using natural languages (Shawar & Atwell, 2007 p.1). Additionally, chatbots can conduct two-way communications and chatbots can communicate through nudging. During the chatbot's system process that allows for two-way communications, the chatbot analyzes the users' text or voice by splitting the text into separate words through chunking (Ahmad et al., 2018, p.9). The chunking process then produces several meaningful phrases that act as keywords in the matching process (Ahmad et al., 2018, p.9). In the matching process, keywords are matched with the pattern in the chatbot system to produce a programmed response (Ahmad et al., 2018, p.9). The programmed response will be, for instance, any other text or verbal reply and this is how chatbots communicate (Ahmad et al., 2018, p.9). Thus, through processes, chatbots can communicate with users in human-like ways (Ahmad et al., 2018, p.7).

Chatbot Design Techniques

Several techniques and approaches are also included in the design of chatbots to help produce relevant communications. For example, popular techniques for designing chatbots include the use of AIML, pattern matching, language tricks, chat script, parsing, Markov chain, as well as SQL and relational database techniques (Ahmad et al., 2018, p.10). AIML tags are useful for saving data, activating other programs, giving conditional responses, and recursively calling the pattern matcher to insert the responses from other categories (Wallace, 2003, p.12). Pattern matching generates, "appropriate responses from user's questions, depending on the matching types such as simple statements, natural language or semantic meaning of enquiries"

(Ahmad et al., 2018, p.10). Additionally, language tricks such as canned responses, no logical conclusion, typing errors and stimulating keystrokes add variety to the knowledge base and further credibility (Ahmad et al., 2018, p.10). The chat script technique concentrates on giving the most optimal syntax to build a sensible default answer when no matches occur in AIML (Ahmad et al., 2018, p.10). The parsing technique is used to, "analyze text or a string of symbols either by using natural language or computer language" (Ahmad et al., 2018, p.10). Other popular techniques like SQL and relational databases allow chatbots to remember previous conversations for future uses (Ahmad et al., 2018, p.10). Lastly, Markov chain identifies the probability of letters or word occurrence in the same textual data set to build more applicable responses (Ahmad et al., 2018, p.10). Thus, popular techniques included in the design of chatbots help produce relevant responses.

Chatbots: Advantages & Weaknesses

Now that I have defined chatbots, I will mention advantages and weaknesses of using chatbots in order to give the audience an understanding of what chatbots practicalities are. Advantages for chatbot users include 24/7 customer service, 24/7 support, one-to-one communication on personal devices, ease of use, and convenience (Zumstein & Hundertmark, 2017, p.103). Other advantages include time and cost savings, reduction on relevant information, reduction on relevant services, and relevant offers based on preferences (Zumstein & Hundertmark, 2017, p.103). On the other hand, weaknesses include, malfunctioning chatbots, unanswered questions, investments in IT, lack of awareness, lack of acceptance by users, information security protection, data protection, and lastly reputation risk (Zumstein & Hundertmark, 2017, p.103).

Research Question and Hypothesis

Research question: Can chatbots support and inform financial decisions in a productive manner?

Low financial literacy amongst individuals and a population can cause negative impacts, but chatbots might be able to enhance financial decisions in a productive manner. Previous research shows how chatbots can support financial decisions in the financial service industry. My research will add to existing research that analyzes the use of chatbots for the purpose of supporting and informing financial decisions by also exploring if chatbots can inform and support financial decisions, both inside and outside higher education. Additionally, my research will also investigate the productivity value that chatbots may offer for the purpose of supporting financial decisions. Accordingly, my research will contribute to answering, "Can chatbots support and inform financial decisions in a productive manner?". Based on the impacts of chatbots used in the financial service industry, this research expects that chatbots used in other settings besides the financial service industry will also support financial decision making in a productive manner.

Methods

For the purpose of this research, I gathered data and content from over thirty-three sources from thirty different publication formats. Accordingly, I used online databases, scholarly articles, journals, news articles, websites, and testimonials to analyze chatbots' built to support and inform financial decisions impacts. From the thirty-two sources gathered, thirteen of them were dedicated to analyzing chatbots' impacts in the financial service industry. Additionally,

seventeen of the thirty-three sources were used to analyze chatbot's impacts in higher education, both inside and out. Productivity levels were also analyzed when researching chatbots' built to support and inform financial decisions impacts. Lastly, I used thirteen sources to list possible considerations for implementing chatbots. All the results from the thirty-three sources found were mentioned to help guide answering my hypothesis question, "Can chatbots support and inform financial decisions in a productive manner?".

Results

Financial Service Industry: Chatbots' ability to impact financial decisions and productivity

Productivity

Sources suggest enhanced productivity as a result of implementing chatbots for the purpose of supporting and informing financial decisions in the financial service industry. For example, "literature suggests that internal facing CAs that assist employees could lead to higher efficiency, engagement, morale and productivity among employees" (Waisenegger et al., 2020, p.5181). Additionally, "Accenture estimates baseline growth of the finance sector with AI technologies at $4.6 trillion until 2035" (Kruse, et al., 2019, p.6408). Chatbots use AI and are a part of this estimated growth. For example, Kruse's, Wunderlich's, and Beck's research mentioned that, "A range of FS companies are starting to launch chatbots or robo-advisors, often in their mobile apps or on social media" (Kruse, et al., 2019, p.6408). Kruse's, Wunderlich's, and Beck's research also mention examples of chatbots such as the German insurance company VHV Versicherunge chatbot "Mia" and Deutsche Bank's chatbot (Kruse, et al., 2019, p.6408). Mia helps improve customer service and Robin is used as a digital asset manager (Kruse, et al., 2019,

p.6408). Other examples of chatbots such as Lemonade have been created to provide a "fast, affordable, and hassle-free insurance experience" (Duijst, 2017, p.3). Furthermore, chatbots such as Eva have been used as a virtual insurance agent to help guide and influence financial decisions such as the right coverage package (Duijst, 2017, p.3). Lastly, India's second largest bank, ICICI claims that its chatbots have reduced the response time to customers, "by up to 60 percent thereby sharply improving the bank's productivity and efficiency" (Mehrotra, 2019). ICICI's chatbot helps, "its customers with financial and non- financial transactions, to answer their FAQ's and to identify and address their loan requirements" (Mehrotra, 2019). The examples given show ways chatbots can aid the financial service industry to increase productivity. Thus, there are estimated statistics on chatbot growth projections and evidence that chatbots' productivity value can be translated into the financial service industry.

Business Insider also gives insight of the growth prospects of chatbots due to its productivity value, "Cost savings and improved user satisfaction will continue to drive chatbots growth" (Phaneuf, 2020). Specifically, "Business Insider Intelligence predicts that the global annual cost savings derived from chatbot automation across the insurance industry alone will surge from $0.5 billion in 2020 to $5.8 billion in 2025" (Phaneuf, 2020). Phaneuf explains that, "over time, companies that continue to invest in tech advancements and machine learning for chatbot deployment will eliminate repetitive and time-consuming tasks, while also cutting costs" (Phaneuf, 2020). Phaneuf also explains, "from financial advice to medical help, providing consumers 24/7 access to services has become a key offering for companies looking to stay ahead of competitors" (Phaneuf, 2020). On the client side or user side, "Chatbots: Are they Really Useful?" mentions that users find chatbots effective with answers, easy to use, as well as

like that chatbots reduce interaction times (Shawar & Atwell, 2007, p. 44). Therefore, it appears that chatbots are beneficial to both parties involved. Thus, sources suggest growth prospects of chatbots due to its productivity value.

Influence on Financial Decisions

Research supports chatbots' ability to help support and inform financial decisions. For example, "Robo-Advisory" directly mentions that "Robo-advisory provides a novel way to assist users in their financial decision making processes, and transform existing person-to-person services into digital service platforms" in its research (Jung et al., 2018). In addition, "Robo-advice – a true innovation in asset management" also mentions, "Robo-advice is likely to contribute to financial inclusion and helps financially less-literate households to invest in capital markets" (Kayao, 2017, p.1). Likewise, the findings of "Investment Decisions With Robo-advisors: The Role of Anthropomorphism and Personalized Anchors In Recommendations" study demonstrates that, "increasing degree of anthropomorphism in robo-advisors leads to higher perceptions of social presence, which in turn leads to higher investment volumes as well as higher usage intentions" (Martin et al., 2019, 12). To add to that Martin's, Jonas's, and Oliver's study also reveals that, "personalized anchors in recommendations not only positively influence the perception of social presence, but also have a direct positive effect on investment volumes" showing chatbots abilities to influence and support financial decisions (Martin et al., 2019, 12). Lastly, "Acceptance of robo-advisors: Effects of financial experience, affective reactions, and self-enhancement motives" mentions that chatbots can, "assists people to make decisions regarding savings, asset management and investment, and decisions by asking questions about their goals and preferences as well as their financial situation" through its

technology (Hohenberger et al., 2019, p.1). Thus, chatbot research shows its potential to help influence, support and inform financial decisions.

Other bodies of research also show that chatbots may help guide financial decisions. For example, in "Living or Dying in the Mashup of American Financial Services: Literate Does Not Mean Competent"' research mentions chatbot technology being used in business to connect with clients to help with financial literacy, to help clients navigate money (Riley & Schild, 2019). "Towards Designing Robo-advisors for Unexperienced Investors with Experience Sampling of Time-Series Data" suggests that chatbots can guide customers through an automated (investment) advisory process (Glaser et al., 2018, p.134). Additionally, research mentions that chatbots, "can be helpful tools for investors with low financial knowledge, as well as investors who are susceptible to making financial mistakes" (Glaser et al., 2018, p.134). Furthermore, Lehner & Simlinger also mention that chatbot can have aspects of gamification and gamification elements can, "facilitate financial education of customers as well as their active engagement" (Lehner & Simlinger, 2019, p.5983). Thus, further research suggests evidence of chatbot's ability to help guide financial decisions.

Chatbots in Higher Education: Impact on Financial Decisions and Productivity

Research supports chatbots' ability to productively help influence, support, and inform financial decisions. For example, existing literature such as "Using Artificial Intelligence to Enhance Educational Opportunities and Students in Higher Education" support that actions and decisions relating to finance can be increased using AI (Barrett et al., 2019, p.6). Furthermore, "Using Artificial Intelligence to Enhance Educational Opportunities and Students in Higher

Education" also directly states that the use of chatbot technology can help with FAFSA completion and improved customer experiences (Barrett et al., 2019, p.1). Additionally, besides helping with FAFSA completion, chatbots are also said to, "give faculty and staff the ability to be more effective and efficient when communicating with students" (Barrett et al., 2019, p.1). For example, Georgia State University's chatbot, contributed to, "a 21% reduction in summer melt "(Page & Gehlbach, 2017, p.2). A summer melt is, "the phenomenon where college-intending high school graduates fail to matriculate" and it demands high burdens on participating staff members (Page & Gehlbach, 2017, p.2). Georgia State University's chabot allowed staff to reduce such burdens, and data collected showed a, "stronger overall impact on tasks related to financial aid and college financing" (Page & Gehlbach, 2017, p.6). Thus, from existing literature such as, "Using Artificial Intelligence to Enhance Educational Opportunities and Students in Higher Education" there is evidence that supports chatbots' ability to productively help influence, support, and inform financial decisions.

Other research like "How an Artificially Intelligent Virtual Assistant Helps Students Navigate the Road to College" also shows evidence of chatbots' ability to productively help influence, support, and inform financial decisions. For example, Page's & Gehlbach's research found positive student results with navigating the process of accessing Financial Aid using chatbots (Page & Gehlbach, 2017, p.2). To elaborate a research paper showed evidence of chatbots' ability to assist with scenarios such as, "submitting FAFSA, having a FAFSA verification hold on Financial Aid, accepting any student loan, accepting a Stafford loan, completing loan counseling, and setting up a tuition payment plan" (Page & Gehlbach, 2017,p.6). Furthermore, results from "How an Artificially Intelligent Virtual Assistant Helps

Students Navigate the Road to College" showed that committed GSU students in the treatment group who used chatbots were, "3 percentage points less likely to have a FAFSA verification hold on their Financial Aid, 6 to 7 percentage points more likely to accept a college loan or a Stafford loan, specifically, and 6 percentage points more likely to complete college loan counseling" (Page & Gehlbach, 2017,p.6). Moreover, results from the article suggested, "that the outreach led to larger improvements for first-generation students in navigating the Financial Aid process, although impacts on nonfinancial tasks and GSU enrollment were similar for first-generation and non–first generation college goers alike" (Page & Gehlbach, 2017,p.8). Lastly, the article suggested that, "Artificial intelligence and virtual assistants, such as Pounce, hold promise for increases in efficiency, especially for industries like education that rely heavily on communication" (Page & Gehlbach, 2017, p.10). Thus, existing research suggests that chatbots can productively help influence, support, and inform financial decisions.

Chatbot Nudges: Impact on Financial Decisions and Productivity

"Customized Nudging to Improve FAFSA Completion and Income Verification" shows evidence of chatbot's ability to productively help influence, support, and inform financial decisions through nudging. In the mentioned article, researchers, "collaborated with the Delaware Department of Education to implement a statewide text messaging campaign to encourage high school seniors and their families to complete the FAFSA and to inform students about other pre-matriculation tasks required for successful fall college enrollment" (Page, et al., 2018, p.20). Additionally, the nudging campaign was also implemented at Texas sites. The results of nudging found that across both the Texas and Delaware sites significant impacts of the text-based outreach on FAFSA submission and completion occurred (Page, et al., 2018, p.24).

Specifically, by the end of the FAFSA messaging, “FAFSA submission and completion rates were approximately 6 percentage points higher in the treatment schools compared to control schools” (Page, et al., 2018, p.24). The article also reported that, “In the high participation schools, the texting campaign increased FAFSA submission and completion by 8 and 7 percentage points” (Page, et al., 2018, p.24). Thus, evidence shows that chatbots can productively help influence, support, and inform financial decisions through nudging.

Additionally, “Improving College Access in the United States: Barriers and Policy Responses” also shows evidence of chatbot’s ability to productively help influence, support, and inform financial decisions through nudging. For example, “Improving College Access in the United States: Barriers and Policy responses” examines the evidence of informational and behavioral interventions intended to improve college access and can be found in The National Bureau of Economic Research. The research paper suggested that, simple reminders and well-framed encouragement or nudges have been shown to be, “effective in a variety of settings for improving follow-through with desirable actions” (Page & Scott-Clayton, 2015, p.27). Nudges again are features of chatbots and are suggested to work by capitalizing on students’ relative impulsivity, “encouraging them to make progress with a particular task in the moment rather than putting it off to an unspecified future time” (Page & Scott-Clayton, 2015, p.27). Thus, “Improving College Access in the United States: Barriers and Policy Responses” also shows evidence that chatbots can productively help influence, support, and inform financial decisions through nudging.

“Freshman Year Financial Aid Nudges: An experiment to increase FAFSA renewal and college persistence” is another article and work of research that shows evidence that chatbots can productively help influence, support, and inform financial decisions through nudging. This research investigated the impact of a “personalized text messaging intervention designed to encourage college freshmen to refile their Free Application for Federal Student Aid (FAFSA) and maintain their Financial Aid for sophomore year” (Castleman & Page, 2016). Additionally, the research was conducted through a randomized controlled trial design and its intervention produced large and positive effects among freshmen at community colleges. Within the tested population, an increase in FAFSA files occurred and the “text recipients were almost 14 percentage points more likely to remain continuously enrolled through the Spring of sophomore year” (Castleman & Page, 2016). Thus, “Freshman year Financial Aid nudges: An experiment to increase FAFSA renewal and college persistence” shows evidence of chatbot’s ability to productively help influence, support, and inform financial decisions through nudging both inside and outside higher education.

"Nudging Students Beyond the FAFSA: The Impact of University Outreach on Financial Aid Behaviors and Outcomes”, is another statistically based research article that supports chatbot’s ability to productively help influence, support, and inform financial decisions through nudging. This research consisted of inter-university collaboration that investigated, “the effect of sending targeted, semi-personalized text messages to students during the college application process “(Carleman, et al., 2017, p.4). Additionally, in this research, results provided suggestive and encouraging evidence that students’ Financial Aid decisions, such as “whether to submit applications in advance of priority deadlines and whether to complete supplementary forms like

the CSS PROFILE, are responsive to outreach from their college or university" (Carleman, et al., 2017, p.16). The results were explained to be, "the combination of (a) utilizing communications channels that at a point in time are effective at reaching students; (b) communicating from an organization with whom the student has a valued relationship; (c) leveraging behavioral science principles to design campaigns and content in a way that maximizes student engagement and responsiveness"(Carleman, et al., 2017, p.19). Thus, further research supports evidence of chatbots' ability to productively help influence, support, and inform financial decisions through nudging.

"Small Nudges Can Improve How Students Apply to College" from the Harvard Business review also supports chatbots' ability to productively help influence, support, and inform financial decisions through nudging. For example, this article mentioned that by, "proactively nudging students to complete critical steps in the process like the FAFSA — school districts and postsecondary institutions can increase rates of success with college search, application, and transition among this year's high school seniors" (Page, 2016). The author of the article supports its statement by mentioning a study where, "people who needed to file their forms got nudged to do so, but those who had completed the forms received information on next steps" (Page, 2016). In this study, as a result of this targeted outreach, "earlier and improved rates of FAFSA filing" were reported showing chatbots' effects on financial decision making (Page, 2016). Thus, the Harvard Business review also has content that supports chatbots' ability to productively help influence, support, and inform financial decisions through nudging.

Chatbot Companies: AdmitHub, Ivy.AI, and Ocelot

Sources gathered highlighted AdmitHub, Ivy.AI, and Ocelot as top higher education chatbot producing businesses that productively help influence, support, and inform financial decisions. Accordingly, I analyzed statistics and testimonials to assess chatbot's ability to do so. AdmitHub had the most statistically backed evidence of an increase in productivity and influence on financial decisions. Ivy.AI and Ocelot on the other side had multiple supporting testimonials that suggest an increase in productivity and influence on financial decisions through implementing chatbots. Evidence of AdmitHub, Ivy.AI, and Ocelot chatbots ability to productively help influence, support, and inform financial decisions are listed below by company names.

AdmitHub

AdmitHub shows evidence of creating chatbots' that productively help influence, support, and inform financial decisions. For example, the Harvard Business Review reported that an implemented text-based chatbot from AdmitHub, "Pounce," was able to check in with incoming students to keep them on track with key tasks such as finalizing Financial Aid, attending orientation, and enrolling for the fall semester" (Page, 2016). Accordingly, "AdmitHub's conversational artificial intelligence handled the vast majority of student questions automatically, with less than 2% of messages requiring the attention of a university staff member" (Page, 2016). Additionally, the experiment mentioned reported that chatbot outreach improved student success with key pre-matriculation steps as well as timely fall enrollment (Page, 2016). Therefore, a chatbot from AdmitHub showed evidence of productively helping, influencing, supporting, and informing financial decisions.

Additionally, AdmitHub website's content further supports chatbot's ability to productively help influence, support, and inform financial decisions. For example, Massachusetts College of Liberal Arts implemented an AdmitHub chatbot with the goal of making the Financial Aid department more accessible to students and to emphasize completion of Financial Aid paperwork (Massachusetts College of Liberal Arts Financial Aid Chatbot, 2020). Accordingly, results showed that after the implementation a 28% increase in completed Financial Aid items within one week (Massachusetts College of Liberal Arts Financial Aid Chatbot, 2020). Thus, AdmitHub website's content further supports chatbot's ability to productively help influence, support, and inform financial decisions.

Furthermore, Winston-Salem State University (WSSU) also implemented an AdmitHub chatbot in its campus that productively helps influence, support, and inform financial decisions. WSSU's goal in implementing the chatbot was to increase retention, improve spring registration, and improve on-time bill pay (WSSU Combines Strategy and AI to Increase On-Campus Readiness, 2020). Results of WSSU's chatbot implementation showed 74% increase in bills paid on time, 36% fewer inbound calls, 37% increase in immunization compliance, 8% increase in freshman yield, and a 2% increase in enrollment (WSSU Combines Strategy and AI to Increase On-Campus Readiness, 2020). Additionally, reduced staff burden was also reported as a result of implementing chatbots at WSSU (WSSU Combines Strategy and AI to Increase On-Campus Readiness, 2020). Thus, Winston-Salem State University (WSSU) also implemented an AdmitHub chatbot in its campus that productively helps influence, support, and inform financial decisions.

Lastly, Arizona State University also reported using a chatbot named Sunny from AdmitHub that productively helps support and inform financial decisions. As so, in fall 2018 students were surveyed their opinions on Sunny (Pizzo, 2019, p.15). Results showed, “7 in 10 students found Sunny to be helpful and informational” and “only 2% found Sunny’s information to be inaccurate” (Pizzo, 2019, p.15). Accordingly, out of 59,927 messages received, over 98% of messages were handled by Sunny or AdmitHub. Besides additional assistance with inquiries, “492 estimated hours of staff time were reported saved in 2018” due to students' new ability to get, “automated answers that used to be handled through emails or phone calls serviced by ASU staff” (Pizzo, 2019, p.15). Thus, Sunny can productively help support, and inform financial decisions.

IVY.AI

Ivy.AI is an example of another company that produces chatbots that productively help influence, support, and inform financial decisions. Garcia Brustenga, Fuertes-Alpiste, & Molas-Castells research reported that Ivy.AI creates chatbots that are designed for higher education, by enabling management of admissions, financial services and technological services inquiries through their chatbots (Garcia et al., 2018, p.22). Furthermore Ivy.AI’s chatbots were also reported to include information about the job market, student services and FAQs (Garcia et al., 2018, p.22). Additionally, Ivy.AI’s website reported that its financial services chatbots answer questions about scholarships, work study, grants, and loans as well as SAP guidelines, refunds, tuition payments, and other campus specific procedures (Bot-ify Your Campus). Additioanlly, on Ivy.AI’s website, Pamela Lowrey, a Financial Aid Specialist at Gateway Technical College reported a good outcome from the implementation of an Ivy.AI chatbot within her campus.

Specifically, Pamela Lowrey, gave a testimonial that stated, “Last year we got software for live chat on our website and there were individuals manning it and I thought about how much more work that was for them. Our department was going through a restructuring and the call agents were in high demand. The first time I heard of a chatbot, I did a comparison to what we already had and saw how much better it is and that it can integrate with our own live chat if we needed it” (Bot-ify Your Campus). Furthermore, other positive productivity testimonials of utilizing Ivy.AI chatbots came from Temple University, Creighton University, and the University of Oklahoma (Bot-ify Your Campus). Thus, evidence shows that Ivy.AI can increase productivity while supporting and informing financial decisions.

Ocelot

Ocelot is another company that produces chatbots that productively helps support and inform financial decisions. As so, some higher educations have chosen to build chatbots on Ocelot’s chatbot platform in order to reduce phone calls, support student self-service, ensure consistency of answers, save staff time, promote financial literacy/debt education, and more (Oregon State University Launches "Finn," a Financial Aid Chatbot, Powered by Ocelot). Ocelot chatbots and its videos are ADA-compliant as well as fluent in Spanish (News Archive). Accordingly, “Students and parents can easily use Ocelot Chatbots to get the assistance they need from student services and Financial Aid” (News Archive). Additionally, it is suggested that Ocelot’s chatbots provide ongoing communications that aid student retention and Financial Aid understanding (News Archives). As for productivity, Ocelots chatbots are highly responsive, operate 24/7, and answer over 97.5% of chatbot interactions without the need for human intervention. (News Archive). All day operations are convenient considering that, “more than

40% of chatbot interactions occur after regular office hours" (News Archive). Lastly, Ocelot's website suggests that with, "24 x 7 chatbot availability, you'll have fewer student service and Financial Aid calls to handle during the day, avoid dropped calls, and reduce wait times" (News Archives). Thus, Ocelot produces chatbots that are specifically Financial Aid specialized to productively help support and inform financial decisions.

Financial Aid related professions in higher education have also reported positive impacts such as productive help with supporting and informing financial decisions as a result of implementing Ocelot chatbots. For example, Elizabeth Hilton, Director of Student Financial Services at Riverside City College Community College in California reported Ocelot as, "a game changer for providing access to our students and community" (Community). Additionally, Troy Davis, Director of Financial Aid at Springfield College reported on chatbots' support, "most students access the chatbot after hours and on weekends (Community). Furthermore, Lori Bode Director of Financial Aid at Lindenwood University reported that, "the information provided from Ocelot is accurate and up-to-date" (community). In conclusion, Financial Aid related professions in higher education have reported positive impacts of implementing Ocelot chatbots such as productive help with supporting and informing financial decisions.

Additionally, Oregon State Universities Ocelots chatbot shows evidence of productively helping with supporting and informing financial decisions. Oregon State University named its chatbot "Finn" and it, "provides students with self-service 24/7/365 at the Financial Aid office, saving staff time and improving customer service" (Oregon State University Launches "Finn," a Financial Aid Chatbot, Powered by Ocelot). Additionally, Ocelot's 16,000 knowledgebase Q&A,

and over 2,000 explainer videos provided Oregon State University with, “a Starting point for customization, enabling easy maintenance” (Oregon State University Launches "Finn," a Financial Aid Chatbot, Powered by Ocelot). Accordingly, “Keith Raab, Director of Financial Aid at Oregon State University, said, “Our experience purchasing and implementing the Ocelot chatbot has been very good. Our questions were always answered quickly and thoroughly. Training was great, partly because the system is so easy to use. We would definitely make the same decision to purchase if we had to do it again” (Oregon State University Launches "Finn," a Financial Aid Chatbot, Powered by Ocelot). Thus, evidence of Ocelot’s chatbots’ ability to support and inform financial decisions through its 16,000 knowledgebase Q&A, and over 2,000 explainer videos in a productive manner is supported.

Considerations for Implementing Chatbots

Possible Challenges

Possible challenges may arise when implementing chatbots. Possible challenges for implementing chatbots may include: low technological readiness, a lack of organizational readiness, lack of support from top management, data protection needs, moral concerns, and government regulations (Kruse, et al., 2019, p. 6411). Research also mentions to be cautious of changing optimal channels when implementing chatbots, “While texting provides an optimal channel through which to implement these strategies in the near term, practitioners and researchers will likely have to explore other channels in the years to come” (Carleman, et al., 2017, p.19). Additionally, Becker, Cummins, Davis, Freeman, and Glesinger Hall warn about digital illiteracy and digital equity as other concerns that could decrease chatbot or technological adoptions (Becker at al., 2017, p.22). Furthermore, other research mentions that chatbots can be

helpful only, “if in the user’s perception it behaves in a cooperative way to assist him in achieving his goals and in resolving difficulties” (Georgescu, 2018, p.196). Thus, if a user does not believe the chatbot assists one in achieving goals and resolving difficulties, chatbots are suggested to lead to suboptimal results.

Costs to consider

Cost should also be considered before deciding to implement chatbots. To give an estimate of how much a chatbot implementation may cost, “FATV has given a ballpark quote of about $385,000, or about $17,500, for the other twenty-two VCCS schools to join NOVA. This includes GetAnswers videos (the basic FATV) and the Financial Aid chatbot” (Barrett et al., 2019, p.6). Other AI chatbots being used in higher education like Pounce from AdmitHub costs, “between $7 and $15 per student” (Barrett et al., 2019, p.6). Pounce however is suggested to generate, “an additional $10 million in tuition and fees annually, based on new enrollments and increased retention of current students” (Robinson, 2019, p.7). Furthermore, research found that, “GSU saves a net of approximately $200,000 annually” and spends less than $100,000 on AdmitHub software in comparison to hiring additional staff to respond to its inquiries (Robinson. 2019, p.7). Regarding further chatbot costs, a Financial Aid intervention reported to have reached, “approximately 7,500 high school seniors at a service provider contract cost of $60,000 leading to approximately $8/ students reached” (Page, et al., 2016, p.26). Page’s Castleman’s, and Meyer’s research suggests that the chatbot Financial Aid intervention effects were low costs and caused sizable impacts “(Page, et al., 2016, p.26). Time is also money and it is important to note research from ASU recommends dedicated at least 3 months to implementing chatbots in higher education (Pizzo, 2019, p.9).

Additional Human Help

The need for additional human help is also another thing to consider when thinking of implementing chatbots. As so, evidence shows that humans are still needed in addition to just chatbots, “AI requires human supervision to adequately support students, particularly at the outset” (Page & Gehlbach, 2017, p.2). Furthermore, other research suggests when implementing chatbots, “AI-enabled advising technology cannot handle all of the challenges that students face” (Page & Gehlbach, 2017, p.10). Research also mentions chatbot systems, “can alleviate the need for staff to respond to common questions and instead free their time for those issues that only humans can solve” showing evidence that human assistance is needed for what only they can solve (Page & Gehlbach, 2017, p.10). Furthermore, FINRA's Report on Robo-Advisors: Fiduciary Implications suggests that, “human judgment by a trained financial professional is a necessary element of the fiduciary standard” (Fein, 2016). Additionally, other research mentions that, “it is the humans that meet with clients, communicate the choices, and verify understanding and agreement” when conducting business not chatbots (Riley & Schild, 2019). Other research also states, “In general, the aim of chatbot designers should be: to build tools that help people, facilitate their work, and their interaction with computers using natural language; but not to replace the human role totally, or imitate human conversation perfectly” (Shawar & Atwell, 2007, p. 45). Lastly, an article in Forbes mentioned that from, “nuances of spoken language to unexpected typographical errors, no single computer and no single crowd-augmented system can ever be perfect” and this is one of the reasons why we still need human assistance (Bridgwater, 2016). The article in Forbes also mentions that humans are still needed because, “computers are great at analyzing tough tactical situations, but are still not as good as humans at understanding

long term strategy" (Bridgwater, 2016). Thus, the need for additional human help is also another thing to consider when thinking of implementing chatbots.

Discussion and Conclusion

Low financial literacy can cause negative impacts, but chatbots might be able to enhance financial decisions in a productive manner. Previous ways to enhance financial literacy and financial decisions have been in person classes, seminars, and online games. While there are mixed results of effectiveness to existing methods, it is important to look at alternative methods for influencing, supporting, and informing financial decisions. As seen in the financial service industry chatbots can influence, support, and inform financial decisions. My research further supports the positive impacts that chatbots can have for the purpose of supporting financial inquiries and decisions by looking at other settings where chatbots have been implemented, such as in higher education. Data gathered suggested that chatbots were able to productively support and inform financial decisions. The sources also suggested that while chatbot technology is increasing its capability to better communicate with humans, the use of human interaction and assistance are still valuable. These findings suggest that while chatbots will continue to productively support and inform financial decisions, they will not replace the value that human interaction can provide. It is also important to note that while this research uses secondary data to analyze chatbot's impacts on financial inquiries and decisions, future research can consider testing chatbot's potential to increase financial literacy rates through case studies. Thus, my research is an exploratory project that is a steppingstone to help answer an important question which is "Can chatbots support and inform financial decisions in a productive manner?"

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