

You're the Voice: Evaluating User Interfaces for Encouraging Underserved Youths to Express Themselves through Creative Writing

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ABSTRACT

Minority groups are the fastest growing demographic in the U.S. In addition, the poverty level in the U.S. is the highest it has been in the last 50 years. We argue that the community needs more research addressing this user segment, and we present a novel study about how underserved youths react when presented with different UI designs aimed at promoting creative writing. The act of creative writing *per se* can become the driver of change among underserved teenagers, and researchers should strive to discover novel UI designs that can effectively increase this target group's productivity, creativity and mental well-being. Using MS Word as baseline, our contribution analyzes the influence of a Zen-like tool (designed by the authors and called Haven), a nostalgic but realistic typewriting tool (Hanx Writer), and a stress-based tool that eliminates writer's block by providing consequences for procrastination (Write or Die). Our results suggest that the Zen characteristics of our tool Haven were capable of conveying a sense of calm and concentration to the users, making them feel better and also write more. The nostalgic Hanx typewriter also fared very well with regard to mental well-being and productivity, as measured by average number of words written. Contrary to our initial expectations, the stress-based UI (Write or Die) had the lowest productivity levels.

Author Keywords

User Studies; User Experience Design; Creative Writing; Creativity Support Tools; Civic Media.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

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INTRODUCTION

"We have the chance to turn the pages over / We can write what we want to write / We gotta make ends meet, before we get much older"

— John Farnham, "You're the Voice"

Creative writing is often used as a pedagogical tool to increase literacy. It can also be used to build positive relationships and encourage dialogue across diverse communities. Creative writing gives a voice to marginal groups in society, helping them to tell their stories. In this sense, new tools for creative writers can be used to support community-based writing projects and encourage people from all backgrounds to find their voice and tell their unique stories. But we also believe that creative writing can be used not only for the mental well-being of underserved populations but also as a way to empower people to tell their unique stories and thereby increase society's awareness of their situations and challenges.

The problem, however, is that there are very few studies about what makes a good user interface design for creative writing, as there is no consensual approach to evaluating them. In this paper we propose an approach that addresses, for the first time, a minority user group of underserved youths, by evaluating how they write using different user interfaces. We triangulate data from different sources to assess productivity, creativity and mental well-being of users writing in four different user interfaces: MS Word (the baseline), Haven (our own tool), Hanx Writer (a nostalgic retro-futuristic typewriter), and Write or Die, a stress-based tool that combats writer's block by providing consequences for procrastination.

The remainder of this paper is organized as follows: in the next section, we review related work about research targeted at empowering minority groups, creative writing user interfaces, and supporting creativity. We then present a section describing our own tool for creative writing called Haven, as well as the other tools we used in our experiments. Thereafter, we detail the participants, methods, procedures and results of three studies. We wrap up with a qualitative discussion that also includes some reflections on the entire experience, as well as the overall conclusions.

RELATED WORK

Empowering Minority Groups

Broadly speaking, our research addresses the needs of minority groups, such as underserved youths, working on the premise that creative writing can empower people in these demographics by allowing them to better express themselves, thus enabling them to share their specific challenges with the larger society. In addition, the simple act of creative writing can improve mental well-being, a problem that is more and more prominent in today's world.

Yardi and Bruckman [1] show that minorities are the fastest growing demographic in the U.S., and note that the poverty level in the U.S. is the highest it has been in 50 years. Their results show that socioeconomic differences both reflect and reinforce technology use at home. Our work builds on this growing user segment, a segment that is often overlooked both in research and product design.

Other researchers have studied the role of digital storytelling for the empowerment of marginalized youth through a series of workshops conducted in the context of Palestinian refugee camps in the West Bank and East Jerusalem [4]. Among other relevant conclusions, they note that the most challenging part of all youth workshops is the story development phase, which needs greater focus from educators and more effective tools and processes to be successful [4].

Researchers have also targeted other types of underserved groups. For instance, Cooper et al. [5] observed that the enrollment and interest in Computer Science (CS) at the university level has not increased in proportion to the rise in demand for computing technologies, which has been very rapid in recent decades. They identified key success factors, such as the value of strong partnerships, clear establishment of roles, accomplishment of needs assessment, field-testing, and effective team communication. However, this study was focused on a multidisciplinary effort targeted at improving CS interest among global underserved youth and showing how to make a difference. Minority groups have also been the subject of studies regarding participation of women in the Information Technology workplace [6], career development of minorities, ensuring that a greater number of women and minorities progress to a full career in cyber security [7], and even more specific cases, such as using statistical means and survey data to analyze the success in Germany of ethnic Germans (the majority group) in relation to four different minority groups [8].

To our knowledge, however, there are no studies dealing with bringing the power of creative writing UIs into the hands of underprivileged youths. These users make up the core group of our research.

Creative Writing User Interfaces

The second, and perhaps most important, perspective of our work revolves around creative writing user interfaces and tools. Perhaps surprisingly, there is relatively little research performed around creative writing tools, but some research-

ers, e.g. Magnifico [9], have investigated how to improve the creative writing *process*. Giving students the opportunity to interact with real readers of their work may motivate them not only to write, but also to take on new literacies and to regard themselves as writers in new contexts. Advances in tool support have been mostly made in very specific areas. For example, Yannopoulos [10] proposed a symbolic language intended to express the content of films (motion pictures) much as notes provide a language for the writing of music, therefore bringing a new approach to the creative process of filmmaking.

Since writing is frequently a collaborative activity, some researchers, such as Magnifico [9], chose to study the use of tools and resources for computer-supported collaborative writing. They implemented a custom-made, computer-supported environment that enables pairs of high school students to collaborate in writing an argumentative essay. They concluded that the tools analyzed reflected the writing strategies adopted by the students. Other authors focused on computer writing tools used during the production of documents in a professional setting [11]. They report on a focus group conducted with professional writers, in which writers narrated their experiences using computer tools to write documents, describing their practices, pointing out the most important problems they encountered, and analyzing their own needs. Based on this work, they describe LinguisTech, a reference website for helping language professionals. Keeping in mind that one goal of digital tools for creative writing is to help users produce greater quantities of writing, some researchers note that the productivity expectations placed on writers are, at present, higher than ever before [9]. Therefore, there is a need for tool support that can promote not only writers' creativity but also their productivity levels.

Coughlan and Johnson [12] present three perspectives on creative interaction that have emerged from four years of empirical and design research. They argue that creative interaction can be usefully viewed in terms of *Productive Interaction* – focused engagement on the development of a creative outcome; *Structural Interaction* – the development of the structures in which production occurs; and *Longitudinal Interaction* – the long-term development of resources and relationships that increase creative potential.

The ultimate goal of our research is to design and build novel user interfaces for creative writing that can be used not only by minority groups but also by as many people as possible. Unleashing the hidden potential of creative writers is, therefore, an essential objective to achieve. Mobile narratives can be one way to reach this goal [13]. This concept allows creative writers to exploit knowledge of the reader's context, by intensifying the user experience and integrating that knowledge into the writing process [13]. Another approach is to use crowdsourcing, as in the case of Soylent, a word processor that integrates crowdsourced human contributions directly into the user interface [14]. Other tools

support the more general concept of creativity. Adventure Author is a learning environment that supports the creative design process that occurs during game design [15].

Finally, it is important to note that creative writing can be regarded as a means to achieve certain goals. For instance, our particular goal is to discover the most relevant user interface design characteristics in order to improve mental well-being of underserved youths, a minority group that can also use creative writing as a way to build positive relationships. But other goals are possible. Jones et al., for example, use creative writing as a means to teach introductory programming [16].

Supporting Creativity

The third dimension of our work is related to supporting and measuring creativity, generally speaking. Today there are many different approaches to measuring creativity: one of the most famous is Flow Theory [2]. Csikszentmihalyi defines flow as “a state in which people are so involved in an activity that nothing else seems to matter; the experience is so enjoyable that people will continue to do it even at great cost, for the sheer sake of doing it” [2]. As the author argues, we all experience flow from time to time and we recognize its characteristics. When we are “in the flow” we typically feel strong, alert, in effortless control, unselfconscious, and at the peak of our abilities.

Csikszentmihalyi posits seven stages that combine together to bring a sense of deep enjoyment and full energy in the flow state:

1. *Focused and concentrated* – completely involved in what we are doing;
2. *A sense of ecstasy* – feeling outside of everyday reality;
3. *Great inner clarity* – knowing what needs to be done, and how well we are doing;
4. *Goals and feedback* – knowing that our activity and skills are adequate to the task;
5. *Serenity* – a sense of having no worries about oneself, and of growing beyond the boundaries of the ego;
6. *Timelessness* – being thoroughly focused on the present, as hours seem to pass by in minutes;
7. *Intrinsic motivation* – whatever produces flow becomes its own reward.

In this paper, we were particularly interested in the following dimensions of Flow Theory: concentration, sense of control, losing track of time, and loss of self-consciousness.

Despite significant efforts spent on creativity research, there is no consensual methodology for evaluating how much creative support a given tool can provide to its users. This is problematic because a solid evaluation is paramount to the design of new creative support tools as well as the improvement of existing ones [17]. One approach to dealing with this problem is the use of *triangulation methods*, which involve several temporal metrics, self-report ratings, external judgments, and physiological measurements [17]. Silva and Read [18] selected and defined four metrics to evaluate their creativity method: Mass of Ideas generated

(MI), which is the number of ideas generated by a group divided by the number of participants; Quality of Ideas generated (QI), the average novelty rating (from three creativity evaluators) multiplied by the average appropriateness rating (from the same three evaluators); Enjoyment of Participants (EP); and Learning of Participants (LP). The five ratings are combined into a single calculable value metric, given by a formula. As the authors mention, HCI is not particularly strong when it comes to the evaluation of methods, especially with regard to creativity and innovation. However, evaluation and comparison are needed not only when one is required to select a specific method to work with, but also when one wants to compare the results of different methods [18].

CREATIVE WRITING USER INTERFACES

We are all writers, the difference is that some of us write, and others don't.

– J. Saramago, Nobel of Literature

This work addresses the general research question of how to design user experiences where the creative side of people is fostered by the peculiarities and elements of the user interface. We started out by addressing the study, design and evaluation of novel user interfaces for supporting creative writing. Our initial goals included the design and evaluation of a new application, which supports creative writers by helping them shape and articulate their thoughts, review texts, and become more creative and productive, as compared to using the currently available tools. After completing the design and development of this tool, called Haven, we selected two more, in different categories: Hanx Writer and Write or Die. In this section, we describe these three different UIs.

Haven: a “Zen” Creative Writing UI

Haven, which was developed previously by our team based on creative writing techniques and the needs of writers, is one of the user interfaces we evaluated during this research.



Figure 1: Snowy writing theme.

Haven includes: a plot generator, a writing prompts generator, background soundtracks, typewriter sounds, and other elements. Most importantly, it features a “Zen-like” design with different writing “themes”, as illustrated by Fig.1 and Fig. 2, which show, respectively, a “snowy white” theme and a “moonlight writing” theme.

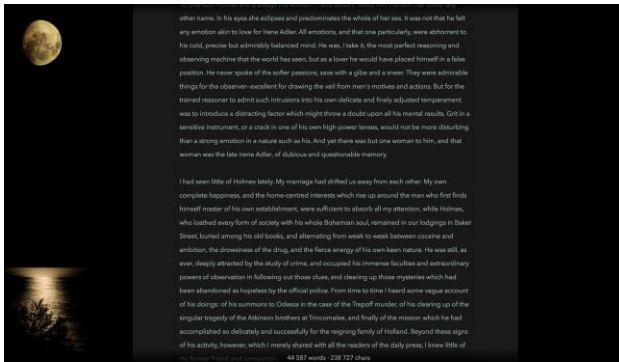


Figure 2: Moonlight writing theme.

The writing prompt is a popup window that displays dozens of different story triggers that can be used to spark the writer's imagination. Fig. 3 shows an example of this.

Tell this story:

He turned the key in the lock and opened the door. To his horror, he saw...

Figure 3: An example of a writing prompt.

The plot generator is similar, but in this case it structures a story plot around two random characters, sets them in a random place (e.g. a river, a university, etc.), in a given situation (e.g. a marriage proposal, a blind date, a love triangle), and suggests a theme for unifying the story (e.g. vengeance, rebirth, opportunity, etc.).

Hanx Writer: the Return of the Nostalgic Typewriter

Just like the cachet of vinyl in an mp3 world, some facets of the typewriter can instill hipster appeal in a writing interface for a post-media user group. After some research, we chose to evaluate the impact of Hanx Writer¹. This tool was recently launched by Tom Hanks, the actor, and gained momentum due to the solidness of its design, which realistically mimics the mass and metal of a real typewriter.



Figure 4: Hanx Writer.

Hanx Writer has a proper sheaf-rolled-in typewriter interface complete with ribbon color choice and margin measurements. Figure 4 illustrates its look. We hypothesized that

the retro analogue appeal could positively influence the creativity, productivity and even mental well-being of our target group of youths.

Write or Die ... no tagline needed!

Write or Die² aims to eliminate writer's block by providing consequences for procrastination. The users write to avoid annoying sounds and alarm warning colors, i.e. if a certain threshold of time passes by without any new words being added to the manuscript, a visual stimulus is triggered and coupled with annoying sounds. Figure 5 illustrates this UI, taken at a time when the background was becoming more and more red in color.

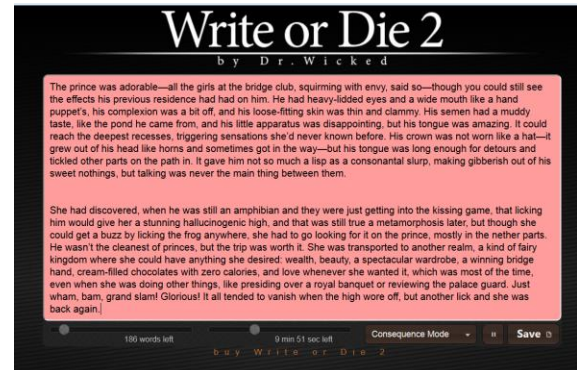


Figure 5: Write or Die.

We hypothesized that our target user group would enjoy the excitement and gaming aspect of this tool, and would be more productive due to the challenge this particular UI brings.

As an introduction to the following experiments, we will first focus on what they have in common: the participants we chose. Since we were interested in empowering marginalized groups by providing them with creative writing tools, we targeted teenagers with learning difficulties, cognitive deficits, and problems of socialization. These teenagers (aged between 12 and 18 years old) were taken from their family environment for various reasons: suffering physical, sexual, or mental abuse; lacking the care and affection appropriate to their age and personal situation; being forced into age-inappropriate conditions such as excessive work; and so on. They currently live and study in a full-time formal education institution at Estabelecimento Vila Mar in Funchal, Madeira. Figure 6 illustrates the environment where they study.

In the next three sections, we will describe the evaluations: including the participants, method, procedure and results of each. All the data taken from the experiments was made completely anonymous.

¹ <http://www.hitcents.com/b2b/work/hanx>

² <http://writeordie.com>



Figure 6: The youths in the educational establishment.

FIRST STUDY: ZEN UI VS. BASELINE

Words were not given to man in order to conceal his thoughts.

– J. Saramago

Our first evaluation study included a two-week experience in the previously mentioned educational institution for underserved youths. We addressed the following research questions:

RQ1: Can a “Zen-like” creative writing UI positively influence the productivity of users?

RQ2: Can a “Zen-like” creative writing UI positively influence the mental well-being of users?

RQ3: Can a “Zen-like” creative writing UI positively influence the creativity of users?

Participants

This preliminary experience involved 14 students from the institution’s population, aged between 12 and 18 years old. There were five females and nine males. We conducted fifteen sessions and used two Mac Minis and eight PCs. As a prerequisite, the participants had to have some interest in writing and a basic amount of computer and Internet experience.

Method

Our experimental design was based on a between-subjects design, in which two groups of students were randomly assembled according to different conditions such as gender, age, computing experience, and Internet experience, to ensure that the groups were similar as possible. The conditions to compare were two tools: MS Word (as baseline) and Haven (a Zen-like tool). The control group used MS

Word, a tool without any explicit creative writing features, and the experimental group used the Zen-like creative writing user interface Haven.

Setting

Before starting the experiment the scope of the study and the rules were explained. Each group was instructed to start by answering the daily challenges and then responding to a daily survey. During the challenges, the two groups were separated in different rooms. Since we were using our tool, Haven, we introduced them to the tool and then left them to try it for a few minutes before they began on the first day.

Procedure

Participants were given a daily writing challenge, and were asked to fill in a very short Likert scale survey about how that daily experience made them feel. No time limit was set for completing the writing tasks.

Examples of the daily writing challenges included: “Write about a time when you used your inner strength to get through a tough situation”; “Write about the bravest thing you have ever done”; and “Write about when someone hurt your feelings”. These were conceived by one of the authors (a creative writing instructor), who also took into account the age of the participants.

The daily survey was based on the following Flow Theory dimensions: (i) intense and focused concentration on the present moment, (ii) sense of personal control or agency over the situation or activity, (iii) loss of reflective self-consciousness, and (iv) distortion of temporal experience. Participants ranked a 7-point Likert scale based on questions such as: “I felt very concentrated during this challenge” and “I lost track of time during this challenge”.

Results

We analyzed the results from a perspective that triangulates the words written, the data from the surveys, feedback from the teacher, interviews with the students and the stories themselves.

Productivity was measured using the average number of words as an estimate. Creativity and mental well-being were measured using subjective, quantitative (Likert scale-based) daily surveys which were constructed from the Flow Theory’s concepts [2]. Note that each student completed a daily writing challenge during the period of 15 days in a row, for a total of 43 data points, as the average number of participants, per day, was around 9 (not all students participated every day).

RQ1: Can a “Zen-like” creative writing UI positively influence the productivity of users?

To analyze the deviation data normality we used the Skewness and Kurtosis and Kolmogorov-Smirnov tests ($p < 0.05$). We concluded that our sample had a deviation of normality as showed in Figure 7.

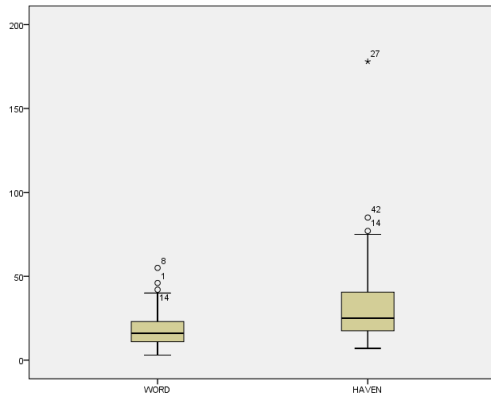


Figure 7 - Box plot

Regarding data dispersion, users in the experimental group (using Haven) wrote more words ($M=34.3$, $SE=4.3$), than those in the control group using our baseline MS Word ($M=18.3$, $SE=1.7$). The non-parametric Wilcoxon test was applied to evaluate MS Word and Haven deviation differences. For students using Haven the results were significantly higher than students using MS Word ($T=9$, $z=-3.7$, $p<.05$, $r=-.56$).

RQ2: Can a “Zen-like” creative writing UI positively influence the mental well-being of users?

In order to assess the participants’ mental well-being as well as its evolution along the two weeks of this study, we asked them to select up to three adjectives from the following list: Surprised, Delighted, Laid back, Depressed, Pacific, Happy, Tired, Bored, Sad, Satisfied, Frustrated, Angry, Serious, Animated, Distressed, Creative, and Frightened.

Figure 8 shows all the word clouds automatically generated according to each daily writing challenge (the numbers indicate the corresponding day). We can see that Happy and Creative were increasing slightly along the weeks, although the most relevant observation is simply the confirmation that most adjectives indicated a positive mental well-being.

Figure 9 displays the total count for each adjective selected by the participants. We can see that Happy, Animated, Laid

back, Satisfied, and Creative are the most chosen adjectives, especially when using Haven.

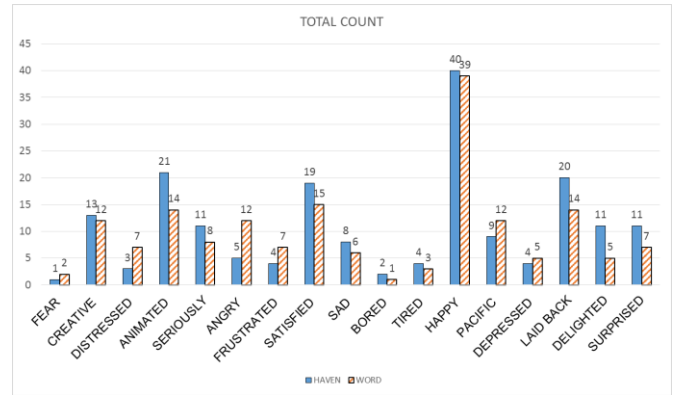


Figure 9: Total count for the adjectives chosen by participants.

We proceed using repeated measures such as Friedman’s ANOVA approach to testing differences between each tool from the answers in the survey based on the dimensions of Flow Theory and ranked by participants in a seven-point Likert scale.

The dimensions (ii) sense of personal control or agency over the situation or activity, (iii) loss of reflective self-consciousness and dimension, and (iv) distortion of temporal experience did not have statistical significance when compared with each tool.

For the other dimension, (i) intense and focused concentration on the present moment, $Fr(1)=4.00$, $p<.05$ was statically significant. Therefore Wilcoxon tests were used to display if there were any differences between the control group using MS Word and the experimental group using Haven. The results showed that for the participants in the experimental group, concentration levels were significantly higher than in the control group ($T=24$, $z=-2.05$, $p<.05$, $r=-.25$).



Day	Adjective	
	Happy	Creative
D1	3	4
D2	3	2
D3	4	3
D4	3	5
D5	4	4
D6	5	4
D7	4	4
D8	6	5
D8	5	6
D9	4	5
D10	7	6
D11	7	5
D12	6	6
D13	8	7
D14	10	8
D15	10	7

Figure 8: Word clouds for the adjectives that participants selected at the end of each daily challenge. Numbers indicate the day.

RQ3: Can a “Zen-like” creative writing UI positively influence the creativity of users?

Regarding the stories written, and from a creativity perspective, we found some differences between the control and experimental group, with Haven apparently allowing for greater levels of creativity. However, it was not possible to establish this difference with sound confidence. In the remainder of this section we include excerpts taken from the students’ writings.

“In the place where I grew up, there were many, many trees, some more pretty than others, but they all had their particular enchantment, an enchantment that leaves me nostalgic now that I don’t live there anymore. I am now an adult, but I am nothing but a problem for people around me. The only thing I have left is the memory of those beautiful trees living in freedom, dancing in the wind, freeing their leaves during the Winter so that children like me could play in them.” –User4-Haven

“Three wishes? I just wish for my family to be happy, that would be a real dream.” –User7-Haven

“I hit my father hard. Yes it’s true. And it was all because of fighting over school. If I had the power to make something disappear, I would vanish the terror I have from the possibility of being arrested and put into prison.” –User9-MSWord

None of the users had ever taken an experiment such as this one. In the beginning, we found a slight initial resistance to meet the first daily writing challenge, as they were not very familiar with this kind of exercise. Later, students were curious to know what challenges would be proposed next, and that increased their desire to write. Note that the challenges were the same for both the control and experimental groups, and there was no transfer of learning as we were using a between-subjects experimental design. Triangulating the results with semi-structured interviews allowed us to corroborate some of these results and observations. When interviewed, all expressed genuine interest in creative writing and most users emphasized that the background soundtrack in the Zen UI was very helpful in making them relax and thus respond better to the writing challenges. Many of these underprivileged students have had very difficult lives, but we should highlight that some of them aspire to become amateur or even professional writers in the future, and showed great interest in the writing challenges we proposed. Some students claimed to use personal diaries in their daily lives, in which they would record their most meaningful and deeply felt experiences.

SECOND STUDY: NOSTALGIC TYPEWRITER VS. ZEN UI
In our second evaluation, we investigated whether Hanx Writer’s nostalgic, retro appeal could positively influence the students’ creativity, productivity and even mental well-being, as compared to the Zen UI of Haven. In this context, the second study addresses our research question 4.

RQ4: What is the influence of the typewriter UI on the participants’ productivity and mental well-being, when compared to the Zen UI of Haven?

Participants

In this experiment, the participants were 8 students (five male and three female) of a similar age as the same group from the first experiment. We conducted one session and used two iPads running Haven and Hanx Writer.

Method

We employed a within-subjects experimental setup, where we divided the students into two groups: one using the Haven iPad app and another group using the iPad with the Hanx Writer app, randomizing the order. When they finished, we switched the tools and gave them a different challenge, also randomly picked.

Procedure

In this evaluation, we gave the same writing challenge to all students and conducted the sessions in the same room. Each group of participants was instructed to start by answering the challenge in 10 minutes and completing a short survey in the end. The survey was basically the same as in the first study.

Results

We evaluated the overall impact of both the Zen features and the nostalgic, realistic, retro-futuristic typewriter. Again, productivity was estimated as the average number of words produced, and mental well-being was estimated through the Flow Theory survey (the same as in the previous study). We used the Skewness and Kurtosis and Kolmogorov-Smirnov tests ($p < 0.05$) to analyze the data normality. Results show that our data was normal. T-tests were used to compare the statistical significance of the samples using a 95% level of confidence.

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
HANXWRITER	,228	8	,200 [*]	,896	8	,266
Haven	,196	8	,200 [*]	,859	8	,117

^{*}. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Figure 10 - Test of normality

From observation, both tools aroused the curiosity of the participants. The most effective elements were the key-stroke sounds and realistic animations in Hanx Writer, and the background soundtracks of Haven. Haven does not allow writing in landscape orientation (we used iPads) and that created some disappointment with users, since they felt it would be easier to write in that orientation. Note that, for these students, anything that does not make them achieve their objectives immediately creates a great sense of anxiety and frustration, as the teacher told us when interviewed:

“For these students, when we give a different type of routine other than the ones they are accustomed to, and if for some reason they do not achieve their objective, they tend

to react in a frustrated manner, much more than the average teenager or student.”-Teacher.

A threshold of ten minutes was set in this experiment, but only three participants used the time in its entirety. The remaining participants wrote their short stories in less time. Using Hanx Writer, participants wrote on average more words ($M=41.3$, $SE=6.5$) than using the Zen UI of Haven ($M=38.5$, $SE=9.6$). However, this difference was not found to be statistically significant ($t(14)=0.22$, $p<0.41$). Both tools were effective in putting users into a good mood, selecting the adjectives that reflect this attitude: animated, happy, creative, and so on.

We also used repeated measures such as Friedman’s ANOVA approach to test differences between each tool when compared with Flow Theory. In all dimensions, (i) intense and focused concentration on the present moment, (ii) sense of personal control or agency over the situation or activity, (iii) loss of reflective self-consciousness, and (iv) distortion of temporal experience, results were not statistically significant when compared with each tool.

We complemented this information with semi-structured interviews performed after the experiment, which suggest that both Haven and Hanx Writer were equally pleasing and effective.

THIRD STUDY: WRITE OR DIE

Finally, we hypothesized that our target user group of marginalized youths would enjoy the excitement and pressure brought by Write or Die, and would be more productive due to the challenge element of this particular UI.

RQ5: *Can the pressure and stimulus provided by Write or Die positively influence the productivity of participants?*

Participants

In this experiment, 10 students participated (eight males and two females) with a similar age to the same groups before. We conducted one session and used 10 PCs.

Procedure

In this case, we did not divide the participants into groups. Instead, they were all together in the same room. The writing challenge was solved using the tool Write or Die. All participants began responding to the challenge at the same time and were given 10 minutes as a max timeout. They finished the experiment and then answered a short survey (the same as the second study survey). The experimental setup and procedure were thus exactly the same as in the second study.

Results

This experiment was based on a premise taken from our observations of previous experiments: we wondered whether the student would write more if presented with a UI that used pressure as a motivation tactic.

Results showed that the participants using Write or Die wrote an average of 26.6 words ($SE=5.7$), which contrasts clearly with both Haven ($M=38.5$, $SE=9.6$) and Hanx Writer

($M=41.3$, $SE=6.5$). For exactly the same conditions and experimental setup, the difference was not statistically significant when comparing Write or Die with Haven ($t(14)=1.22$, $p<0.12$), but was significant when comparing Write or Die with Hanx Writer ($t(14)=1.87$, $p<0.05$).

Semi-structured interviews conducted after the writing challenges suggest that participants did not find the auditory stimulus (an alarming noise that Write or Die produces when the user is not writing, not to be confused with Haven’s calming soundtrack) to be a productive influence; in fact almost all participants found it too stressful, which is particularly significant since they were very excited with this new tool at the beginning of the experiments. Figure 12 plots the total count of adjectives selected by the participants at the end of the experiment’s survey. We can see that users’ mental well-being was also very good, as most of the adjectives selected were positive (happy, animated, satisfied, and creative). In fact, the downside of Write or Die was lower productivity, as measured by average number of words written.

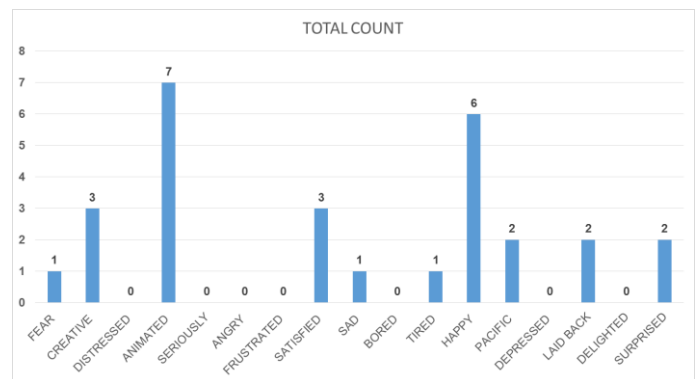


Figure 12: Total count for the adjectives selected by the participants when using Write or Die.

COMPARING CREATIVE WRITING USER INTERFACES

Finally, it is possible to combine productivity (as measured by the average number of words written) with the Flow Theory dimensions into a single radar chart, normalizing the results (average number of words written) into the 7-point Likert scale. This allows a fast and useful comparison of different tools.

Figure 13 shows the combined results for our experiments and the different tools involved. By looking at the figure, one can see that the sense of control was not a significant issue for any of the tools we evaluated. MS Word, Haven, Hanx Writer and even Write or Die exhibited high Likert-scale values in this dimension. The same observation is valid for the Concentration dimension. The greater difference between the tools was found to be in the Loss of self-consciousness and Distortion of time dimensions. According to the survey, participants reported feeling less self-conscious while using Hanx Writer and Write or Die. The same happened when asked about losing track of time.

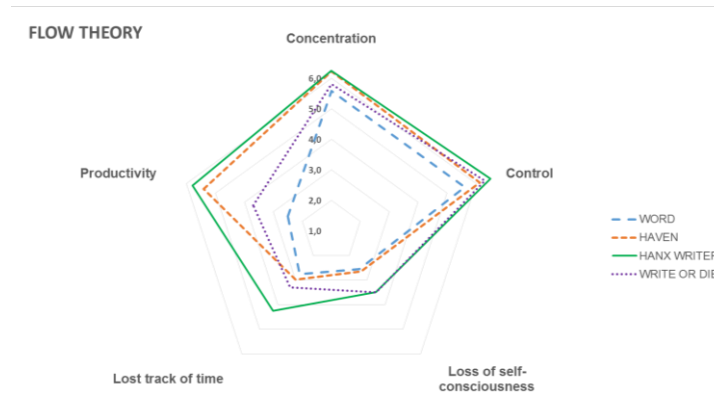


Figure 13: Framework and chart for plotting and comparing creative writing tools.

DISCUSSION

During all of the experiments, it was clear that the participants became intensely focused in the writing moment. A loss of reflective self-consciousness was also reported. From a qualitative perspective, some users described their experiences, usually emphasizing the tool and writing challenges they felt better with. For instance: *“In the story we had to write about a man sitting on a park bench, that’s when I felt most creative, because having that jump start a lot of things came into my mind and I felt in the mood for writing, forgetting about everything else. It was my longest text.”* (User9-Haven). Therefore, the writing prompts were observed as effective tools for kickstarting the creative writing process. Another effective feature was the background soundtrack: *“With the music, so many things started to come to my mind ... without the music my thoughts got lost”* (User5-Haven).

It was clear that all participants felt somewhat empowered and creative during the experiments, especially when using Haven. *“I thought about things I had never imagined before, I felt very creative”* (User11-Haven). According to the teacher who observed later, if one considers the low levels of education, socialization and problematic past experiences and behaviors of the test subjects, then both Haven and Hanx Writer were effective user interfaces for getting these users writing. The students became more creative and even felt better, happier and more relaxed. Finally, regarding the users’ intention to adopt the tools, it was clear that they exhibited a positive attitude towards using them, for example: *“We should use this tool during class or to do our homework. It makes me want to write more.”* (User 4-Haven).

One limitation of our study is that it does not consider the long-term usage of these tools. Therefore, conclusions are limited to an incipient (two-week) usage of the different creative writing user interfaces. However, it is still very useful to have this data, since overcoming initial resistance is the key to unleashing the creativity and writing skills that these teenagers possess.

CONCLUSION

Public access to culture, especially literary culture, is one of the greatest achievements of modern civilization. Writing is among the oldest human activities and creative writing is an essential activity in many industries and professions. Creative writing is also often used as a pedagogical tool to increase literacy and can be used to build positive relationships and encourage dialogue across diverse communities. Creative writing gives a voice to marginal groups in society, allowing them tell their stories.

In this paper we presented a novel approach that addresses, for the first time, a minority user group of underserved youths and evaluates how they write using different user interfaces. Specifically, we described three experiments that analyzed the impact of different creative writing user interfaces on the productivity and mental well-being of underserved youths. We compared MS Word (our baseline), a “Zen” user interface (Haven), a nostalgic typewriter (Hanx Writer), and a stress-based tool called Write or Die. From a productivity perspective, our results suggest that the typewriter UI was the most effective, followed closely by the Zen UI. From a mental well-being perspective, it was clear that this marginalized group felt more inspired, more focused and more immersed when using the Zen UI and the typewriter UI. Contrary to our initial expectations, the stress-based UI (Write or Die) showed the lowest productivity levels.

We have addressed these somewhat sensitive issues and tried to empower underserved youths with user interfaces that help them to find their inner voices and express themselves. Moreover, our results have a practical utility for interaction designers who are interested in devising new interaction styles and designs that can promote positive relationships and even encourage dialogue across diverse communities. Our tool Haven is a first step, but certainly there is plenty of room for advancement and many discoveries to be made. By presenting a perspective on how underserved teenagers use creative writing tools, we hope this paper might inspire the design and development of novel and empowering digital tools.

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