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A Framework, Checklist and Guidelines for Motivating Arab children whilst using Web-based Story-Writing Tools

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by

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Abstract

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Mashael Mohammed Asiri

Writing is an important skill for students, especially for children. Narrative writing is one of the strategies that is used as a pedagogical strategy for elementary school education to improve writing processes. Teachers use a narrative writing strategy as a mechanism to improve children's ability generally in terms of their use of grammatical structures and to expand vocabulary. However, students need motivation to plan their ideas, draft, write, evaluate, edit, and proofread for spelling, diacritical marks and punctuation errors. For that, students are less motivated to write, as teacher commonly only use unattractive and unchallenging activities to arouse their interest in writing. Digital storytelling/storywriting is considered an effective way to enhance students' skills, such as writing. A variety of available offline and online tools can be used to create or write digital stories in education. No study has been conducted to explore the components that can motivate children's in web-based story-writing.

Exploring the different requirements to motivate children from the different aspects, psychological, cultural, educational and technical may help show how web-based story-writing tools could be designed for Arab children to become more motivated. Moreover, it can help teachers to choose an appropriate web-based story-writing tool for their students. Therefore, it is important for teachers to know what is an appropriate web-based tool for children, as well as the developer to know what to build into the Arabic web-based tools, in order to motivate children into the activities.

This research proposes a framework to identify the requirements that motivate children whilst using web-based story-writing tools. This framework explores the requirements that motivate children based on theories and best practice of psychological, cultural, educational, and technical perspectives. The framework has been validated through using triangulation: a literature review, experts' review, and a survey with people who work closely with children. This research develops a checklist for Arab teachers to assess an appropriate web-story-writing tool that can motivate children. For validation, the checklist went through a series of tests, and the test results found that the checklist was reliable. Following the development and validation of the framework and checklist, guidelines were developed and validated by focus group discussions. The outcome of this research has provided recommendations for future designs of web-based story-writing tools.

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Storybird (https://storybird.com/)

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Alefbata https://www.alefbata.com/

Anasworld https://anasworld.net/

Research Thesis: Declaration of Authorship

I, Mashael Mohammed Asiri

declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

A framework , Checklist and Guidelines for Motivating Arab children whilst using web-based story-writing Tools

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signature: Date:

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Definitions and Abbreviations

DST: Digital Storytelling which integrated the multi-media and storytelling

ARCS: ARCS (Attention, Relatedness, Confidence, Satisfaction) Model of motivation

EFA: Exploratory Factor Analysis, one of techniques in factor analysis to analyse the relationship between measurable variable

HCI: Human Computer Interaction

IBM SPSS: software to statistical analyse the collected questionnaire.

IMMS: Instructional Material Motivational Survey

KMO: Keiser-Meiyer-Olkin

PCA: Principal Component Analysis

SETr: The Framework of Sustainable, Educational, and Technical Requirements for motivating children to write Arabic stories in web-based story-writing tools.

SETcl: Sustainable, Educational, and Technical checklist for motivating children to write Arabic stories in web-based story-writing tools.

Chapter 1 Introduction

The integration of multi-media and storytelling initiated Digital Storytelling (DST), which helped to meet the numerous requirements of people. These included communication and self-expression, as well as to incorporate better teaching levels and skills' improvement. DST is a dynamic tool that is able to be utilised for a variety of reasons through many contexts, which can relate either individually or within different groups. Moreover, as many researchers have shown, DST provides different opportunities for students' skills improvements within formal education settings, which include: achievement and critical thinking; problem solving; learning through cooperation; motivation (Belet & Dal, 2010; Frazel, 2010; Hung, Hwang, & Huang, 2012; Malita & Martin, 2010; Ohler, 2013; Yang & Wu, 2012). Furthermore, it has been reported through different studies how personal participation in designing, creating and presenting individual ideas of DST helps students to increase their digital, global, technological, visual and informational literacy levels, together with other academic skills (Malita & Martin, 2010; Ohler, 2013; Robin, 2009; Skinner & Hagood, 2008; Yuksel, Robin, & McNeil, 2011). What is more, Ohler (2013) and Robin (2009) have suggested that teachers should employ DST within their practice with students, in order to increase the comprehension of abstract or challenging concepts, as well as to facilitate discussions on different issues. Hence, digital stories can subsequently either be developed by students individually or in groups, and not merely from the teachers' examples.

Students' writing is among the things that DST can improve (Xu et al., 2011;Kuo, et al., 2012, Sarıca & Usluel, 2015). Writing is an important skill that involves a number of cognitive components, especially for children (Olive, 2004). If the children can write clearly through a required set of symbol and signs, they can express their feelings, thoughts, and experiences (Sarıca & Usluel, 2015).Narrative writing is one of the strategies that is used as a pedagogical strategy for elementary school education to improve writing processes (UK National curriculum, 2013). Teachers use narrative writing strategy as a mechanism to improve children's ability in terms of their use of grammatical structures and to expand vocabulary. However, writing is also a skill that is difficult to comprehend. Students require the motivation to plan their ideas, draft, write, evaluate, edit, and proofread for spelling, diacritical marks and punctuation errors. Moreover, they need to master the use of the grammatical structures, vocabulary, mechanics, content, organisation and style. Thus, students face obstacles when writing, such as: a lack of ideas; mistakes in grammar; using unsuitable vocabulary; and using inappropriate diacritical marks. Besides, they may think that writing is a boring activity to undertake. Above all, students are less motivated to write, as teachers generally only use unattractive and unchallenging activities to arouse their interest in writing.

Motivation is vital in the development and enhancement of an individual's behaviour, which is imperative in improving a student's learning ability and in advancing the beneficial connection between educator and learner (Pintrich, 2003). The concept of motivation is closely related to the achievements of student learning, and is commonly considered to be a key factor in the continual learning process (Paas, Tuovien, van Merriënboer, & Darabi, 2005). Specifically, students who have low levels of motivation more often fail to learn at their optimum level; students who have high motivation levels demonstrate more exploratory learning behavioural traits (Martens, Gulikers, & Bastiaens, 2004). Schiefele (1991) stated that even though motivation is connected with the achievements of learning, motivation provides a positive emotional development for students during learning, which is vital to one's development. Nonetheless, Weiner (1990) stipulated that it is important for an educator to know and practice different methods of motivation. Hence, motivational design is used as "the process of arranging resources and procedures to bring about changes in people's motivation" (Keller, 2010, p.22)

Referring to previous situations, a teacher's first responsibility is to motivate students with activities that are easy and enjoyable to take part in. One way to engage students' interest in writing is by integrating technology to the writing learning process. Digital storytelling/storywriting is considered an effective way to enhance students' skills, such as writing (Sarıca & Usluel, 2015). Moreover, a variety of available offline and online tools can be used to create or write digital stories in education. However, to the current researcher's knowledge, no consideration has been given to design Arabic story-writing tools that target older children (9-12 years old). Additionally, no study has been conducted to explore the components that can motivate children's in story-writing tools. Exploring the different requirements to motivate children from different aspects, psychological, cultural, educational and technical may help show how web-based story-writing tools could be designed for Arab children. Also, this helps teachers to choose an appropriate web-based story-writing tool for their students. Therefore, it is important for teachers to be aware of an appropriate tool, as well as the developer, in order to know what to build into the Arabic web-based tools to motivate children into the story writing activities.

The current research identified many research opportunities that contribute to fill the gap of knowledge in motivating children whilst using web-based story-writing tools, such as:

- A lack of a framework that identifies the important requirements for motivating children based on psychological, educational, cultural and technical perspectives in online and offline environments;

- A lack of instruments to check the appropriate web-based story-writing tools that motivate children into activities;

- A lack of design recommendations for designing Arabic web-based story-writing tools.

These research opportunities raised a set of research works that were planned in order to answer the research questions in the following section. Firstly, an investigation was undertaken to determine the requirements to motivate children whilst using story-writing tools based on theories and studies in both online and offline environment. After that, a checklist was developed to support teachers in identifying and assessing web-based tools that can motivate children whilst writing stories. Finally, guidelines were developed based on the requirements' investigation and checklist to help developers build Arabic web-based story-writing tools.

1.1 The Research Questions

This research aims to answer the following research questions:

RQ1. ***What is a suitable framework for identifying the requirements that motivate 9-12 years old children whilst using Arabic web-based Story-writing tools?***

Due to the lack of a framework that identifies the important requirements for motivating children based on psychological, educational, cultural and technical perspectives, this particular question needed to be answered. It was firstly necessary to investigate what can motivate children based on previous researches and theories on the psychological, educational, cultural, and technical perspectives that may affect positively upon children's motivation to write stories. In the current study, the conceptual framework has been developed and confirmed by using a triangulation approach of a literature review; expert interviews; and a survey with people who work closely with children. The confirmed framework is used as a baseline to be able to answer the next following research question.

RQ2: What is the appropriate instrument to support Arab teachers in identifying and assessing Arabic web-based story-writing tools that motivate children?

Due to the lack of instruments to check the appropriate web-based story-writing tools that motivate children into activities, the current research developed a new instrument that formed a checklist to help teachers in assessing and identifying appropriate web-based story-writing tools. The checklist has been developed in order to validate using the conceptual framework. Also, the checklist items have been developed based on the results of the experts' interview, as well as the Goal-Question-Metrics (GQM) approach. The checklist was validated through a series of validation tests.

RQ3: What are applicable guidelines for designing Arabic web-based story-writing tools that motivate children to do the activities?

Due to the lack of design recommendations in designing Arabic web-based story-writing tools, a set of design guidelines to help researchers and practitioners was required to design web-based story-writing tools that target children's motivation levels. Guidelines have been developed based on the conceptual framework and the checklist. Furthermore, the developed guidelines have been validated based on focus group discussions and experts' feedback.

1.2 Thesis Structure

The current thesis structure is illustrated in Figure 1.1, and structured as follows:

Chapter Two - Digital Storytelling and StoryWriting: this chapter provides the background and the benefits of using storytelling, digital storytelling/storywriting in an educational context. At the end of the chapter, the characteristics of a variety of offline and online story-writing tools are mentioned that have been used in different researches.

Chapter Three - Literature Review: this chapter explores previous researches in children's motivation based on four parts. The first part relates to the overview of motivational theories based on psychological aspects. The second part focuses on the motivation and cultural requirements. This part explores Arab cultures, and then specifically compares between Saudi Arabian and British culture. The correlation between culture and language is also identified, which states the characteristics of the Arabic language and the differences between it and English. The third part reviews research studies in regards to children's motivation, in order to identify the requirements based on educational perspectives. The reviews include teachers' and peers' roles in children's motivation, as well as ARCS model for motivational design. The final part reviews previous studies that relate to children's motivation based on technical perspectives. In particular, this part discusses the overview of usability in an online environment, together with challenges and their effects on interface design. The importance of usability with various aspects, such as motivation, children, culture and Language are also discussed.

Chapter Four - Study 1: Development of the Framework of Sustainable, Educational and Technical Requirements (SETr): this chapter consolidates and reviews the previous research in chapters Two and Three to understand the issues of story-writing tools and children's motivation through four perspectives: psychological, educational, cultural and technical aspects. Research gaps are identified from Chapters Two and Three. In addition, this chapter illustrates the process of

developing the framework that identifies the factors and requirements for the conceptual framework. The factors and requirements that have been considered proposed the framework.

Chapter Five – Study 1: Confirming the Framework of Sustainable, Educational and Technical Requirements (SETr): this chapter describes the research methodology, as well as provides justifications for selecting the following: research design, research approach, methods of data collection and data analysis that have been used to confirm Study One. This chapter indicates the design of the research method (expert review and survey), procedures, sample size and research ethics for the current study. Also, this chapter presents the results, analysis, and discussion of the findings; whilst based on the analysis, the conceptual framework was confirmed.

Chapter Six - Study 2: Development of the Sustainable, Educational Technical Checklist (SETcl): this chapter presents the development of the SET checklist, which was developed to assess the web-based story-writing tools. This chapter describes the process of metrics' development for the SET checklist into two parts. The first part defines the factors and components, while the second part is the items generation that uses Goal-Question-Metrics approach, as well as the results of the experts' review from Study One.

Chapter Seven - Study 2: Validating the Sustainable, Educational and Technical Checklist (SETcl): this chapter demonstrates the validation tests to validate a new developed SET checklist. The validation test includes both content validity and construct validity; also, methods, participants, and procedures for each validation test have been discussed. At the end of the chapter, the final SET checklist is identified based on the validation results.

Chapter Eight - Study 3: Development and Validation of Guidelines for Web Designers to design motivated Arabic web-based story-writing Tools: this chapter provides a set of guidelines to help researchers and web designers to design motivated web-based story-writing tools. The guidelines are developed based on the SETr framework (Chapters Four and Five) and the SET checklist (Chapters Six and Seven). The guidelines have been validated by focus group discussions with 10 experts**.**

Chapter Nine - Final Discussion - this chapter discusses the research questions that related to the framework, checklist and guidelines in the current research. This chapter summarises the implication of this research for researchers and practitioners, and the implications for the educational context. This chapter also includes the limitations that were faced when the research was conducted.

Chapter Ten - Conclusion and Future Work - this chapter provides a brief summary of the research that was conducted during this thesis. This chapter presents the contributions and the expected future works for this research.

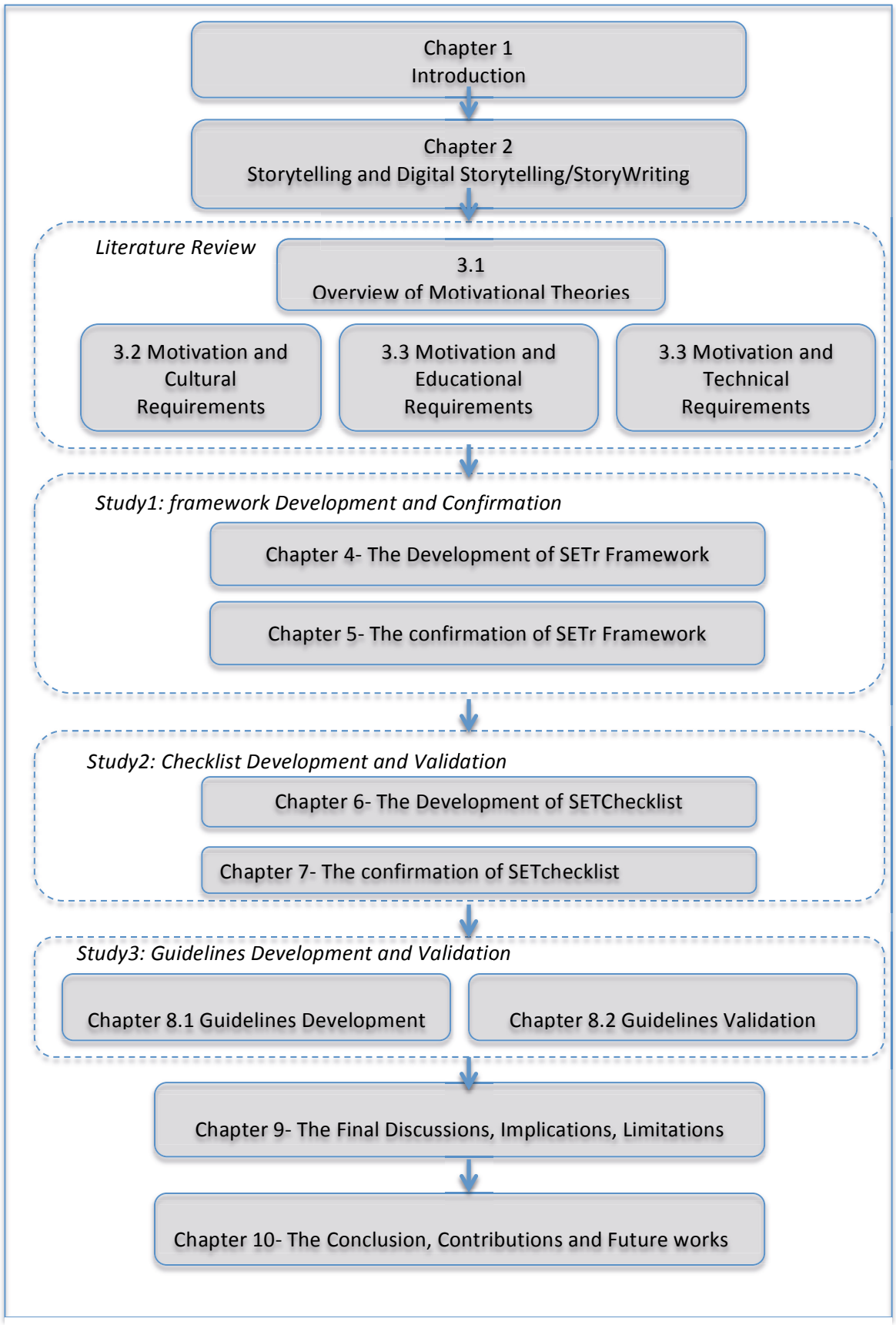

Figure 1.1: Overview of Report Structure

Chapter 2 Digital Storytelling and Story Writing

The aims of this chapter are to understand the background and benefits of applying storytelling and digital storytelling in an educational context.

2.1 Storytelling

The purpose of this section is to review the background of the existing literature on storytelling. The section begins by defining narratives or stories and then goes on to discuss the benefits of using storytelling in education.

2.1.1 Narrative or Story Definition

Before proceeding to the background of the research, it is necessary here to firstly clarify what is meant by the term “narrative” or “story”. Generally, a narrative is a story that may be told verbally or in writing to connect events and is frequently used in literacy, art, sign language or gesture (Narrative, n.d.). A narrative can be conceptualised as a basic form of storytelling in which the narrator or teller uses narrative structure, imagination and themes to communicate with the audience (Roney, 1996). Narrative or story themes usually combine unrelated elements, such as experience, characters, events, situation and actions that are all synthesised in the beginning, middle and end to give meaning to these elements (O’Neill, 1996).

Most narrative theorists have used the terms ‘narrative’ and ‘story’ as synonyms (Ricoeur, 1981; Rimmon-Kenan, 1983). However, Margolin and Leitch (1988) have distinguished between the two terms by referring to the closure or the structure of story. They suggested that the evaluation of a poor or good story is based on the story structure. They further stated that some narratives are potential stories when extracted from an original context, while some are no longer considered stories as they remain open-ended. However, this distinction between narratives and stories has been criticised by Carr (1986), for the reason that the story elements and human consciousness often have the same structure as a narrative, such as a beginning, middle and end, which can be received as a story and not a potential story . In addition, the one-story element has a series of smaller parts, such as an event consisting of many events (Rimmon-Kenan, 1983). Therefore, Based on Carr (1991) and Rimmon-Kenan (1989) arguments, the narrative or stories are defined as a single or a series of events, actions, or experiences that have beginning, middle and an end.

Moreover, literacy theorists deal with narratives and stories in the manner which they do as these are their products. This narrative product can be identified and described through the narrative

story structure by means of graphic illustration. The graphic illustration of Freytag's pyramid found that the narrative is a linear plot, while others have tried to introduce two-dimensional pyramids (Ong, 1978). However, those linear models have failed to follow the structure of stories or narratives in all cultures of life. Therefore, theorists reverted back to the idea of narratives which are grounded in a structured context.

While a variety of opinions of the terms 'narrative' or 'story' have been discussed, this research will deal with narratives being defined as the story and, therefore, focus on the structure of stories. Carr (1986) and Eagleton (2011), for example, were concerned with the internal relationship between elements within narratives, and not per se with the meaning of the narrative.

In this study, it is essential to understand why storytelling strategy is important and what characteristics of storytelling should be applied. This will be further discussed in the next section

2.1.2 Why Storytelling?

Many researchers have addressed the benefits of storytelling as pedagogical strategies in education, which improve literacy skills such as language acquisition, reading and writing. Mello (2001) analysed eight studies regarding using storytelling as pedagogical strategies. The studies included interviews with students and teachers, student recall, fluency measurements and writing narrative from students. The studies found that academic achievements were improved in terms of vocabulary acquisition, writing, fluency and recall. Moreover, the studies showed improvements in self- consciousness, visual imagery and cultural awareness.

Despite narratives or story techniques being suggested in child education and literatures, there is little research or study, which pays attention to the impact of sharing stories or narratives in language development. Isbell et al. (2004) was one of the studies that compared the influences of storytelling and reading stories on language development for primary stage children. The study indicated that the storytelling group achieved over and above the reading stories group with relation to story structure, oral language and story comprehension. Moreover, Cooper (2005) conducted structural activities of stories for pre-school children to explore the potential impacts on six essential skills, namely, oral language, narrative form, convention of prints, code and words. However, other researchers have shown that the impact of narratives even enhances the narrative writing of upper grades such as high and secondary level, (Nicolini, 1994; Wallace, 2000).

Research has mentioned that the presence of both social interaction and collaboration contributes to an increase in the effectiveness of literacy instruction (Dugan, 1997). In creating stories, Aiex (1988), stated that the characteristics of the interaction in storytelling to captivate the audience must be personal, engaging and immediate. Therefore, by providing social interaction, the understanding of stories in literacy will be improved. Moreover, by participating in and observing narrative activities, students can learn the social aspects of languages (Craig, Hull, Haggart, & Crowder, 2001). Several studies have confirmed the effectiveness of creating stories to increase children's awareness of their own culture as well as exploring the culture of others (Cassell & Ryokai, 2001; Hartnell-Young & Vetere, 2008; Huffaker, 2003; Madej, 2003). However, the success of narrative activities is based on language and the knowledge that is presented by the teacher (Vygotsky, 1978). Therefore, the teacher's role is required to direct the communication with individual children in narrative activities. .

Students' narrative skills are developed through a series of stages. Research indicated that, by first grade, students with common language development produce, as a minimum, chain narratives (Applebee, 1978). By the end of fifth grade, students ought to be able to deliver comprehensive, numerous-incident stories comprising multifaceted sentences, well-developed characters, mental state verbs, temporal adverbs and comment statements on causal relationships between motives and actions (Gillam & Pearson, 2004). Students with poor levels of narrative growth may be in danger of experiencing academic problems (Paul, Hernandez, Taylor, & Johnson, 1996). Table 2-1 shows the classification of narrative and narrative development derived from Applebee (1978).

However, integrating storytelling with visual aids can be used as visual scaffolding to support student in writing stories. The visual communication used in e-learning material, as Gillani (2000) proposed, ought to entice diverse students. Digital pictures as well as videos, of good quality, are essential to capture the attention and interest of the youth (Agosto, 2001). A digital form of storytelling will be further discussed in the next section.

2.2 Digital Storytelling (DST)

This section provides an overview of digital storytelling, starting with DST definition and, then, the elements of DST. The next subsection discusses the previous research of the effectiveness of DST on different cognitive skills and then, specifically, will discuss the effectiveness of DST on improving writing skills for students. Finally, it shows examples of the most popular online and offline DST tools and a comparison between them.

2.2.1 Digital Storytelling Definition

Digital storytelling (DST) can be defined as a combination of storytelling and multimedia (digital image, video, sound, music and text) to meet individual needs, such as communication skills, self-expression and improvement skills (Sarıca & Usluel, 2015). This term can include a range of digital storytelling, such as web-based stories, interactive stories, hypertexts and narrative computer games. This thesis will focus on web-based story writing.

Table 2-1 the classification of narrative and narrative development derived from Applebee (1978)

Stage no	Narrative Stages	Description
Stage 1	Heap Stories	Heaps contain tags and explanations of proceedings or acts. No dominant theme or association exists. No actual highlights.
Stage 2	Sequence Stories	Sequences entail cataloguing actions regarding a chief theme, character, or setting. No strategy exists. The proceedings could be recorded in any order without altering the significance.
Stage 3	Primitive Narratives Primitive	Primitive narratives comprise of three of the story grammar elements: an initiating event, an action, and some result or consequence surrounding a key theme. There is no actual purpose or conclusion to the story.
Stage 4	Chain Narrative	Chain narratives consist of four of the story grammar elements: an initiating event, a plan or character motivation, an attempt or action, and some outcome or consequence around a crucial theme. There is frequently either cause-effect or temporal relationships, but the plot is feeble and does not develop on the incentives of the characters
Stage 5	True Narrative	True narratives have a significant theme, character and plot. They include motivations behind the characters' actions and comprise of logical and/or temporally methodical sequences of events. Stories at this stage include five story grammar elements, namely; a starting event, a plan or character motivation, an effort or deed, a consequence, and a resolution to the issue.

2.2.2 The Elements of Digital Storytelling

The Center for Digital Storytelling model specifies seven elements for creating digital storytelling as a beginner, which include Point of View, Dramatic Question, Emotional Content, The Gift of Your Voice, The Power of the Soundtrack, Economy and Pacing (Center for Digital Storytelling, 2004). The definition of each element is as following:

- Point of View: refers to the main point of the story and the author's perspectives
- Dramatic Question: the main question that engages the audience and will be answered at the end of story
- Emotional Content: realistic and serious issues which engage the audience strongly in the story
- The Gift of Your Voice: a method to customise the story to help audiences understand it by recording a voiceover
- The Power of the Soundtrack: music and sound that support the story
- Economy and Pacing: the progress of rhythm, which may be quick or slow

These elements have been expanded and modified to be applicable in an educational context (Robin & Pierson, 2005). Ten elements have been produced, which include: The Overall Purpose of the Story, The Narrator's Point of View, A Dramatic Question or Questions, The Choice of Content , Clarity of Voice, Pacing of the Narrative, Use of a Meaningful Audio Soundtrack, Quality of the Images, Economy of the Story Detail, Good Grammar and Language Usage.

2.2.3 The Effectiveness of Digital Storytelling

To date, several studies have confirmed the effectiveness of digital storytelling in enhancing students' skills, which include motivation, writing, reading, problem solving, collaborative learning and critical thinking in an educational context (Belet & Dal, 2010; Frazel, 2010; Malita & Martin, 2010; Hung et al., 2012; Nordmark & Milrad, 2012; Yang & Wu, 2012; Ohler, 2013). Furthermore, it has been demonstrated that different types of literacy, such as information, digital, technology, visual and global, can be improved by students participating in designing, creating and presenting their own digital stories (Frazel, 2010; Malita & Martin, 2010; Yuksel et al., 2011; Hung et al., 2012; Ohler, 2013).

- **Digital Storytelling and Story-Writing**

DST provides an alternative conduit of expression for those students who struggle with writing traditional text (Sylvester & Greenidge, 2011). Moreover, while three studies have examined the effect of DST on writing skill, each study discussed the implementation process, the tools used and the context in a different manner (Xu et al., 2011; Kuo, et al., 2012, Sarıca & Usluel, 2015). One study conducted an experiment to compare the effectiveness of offline and online DST tools on writing self-efficacy for university students (Xu et al., 2011). The results of the experiment demonstrate that digital storytelling in an online learning environment is more effective than digital storytelling off-line. In addition, when students are fully engaged in the writing process, they embrace their stories and participate in the digital story creation process more effectively by

developing a good scenario (Xu et al., 2011). Another study has examined the effects of DST on writing skills for primary school students (Sarıca & Usluel, 2015). The findings show that DST created statistically a significant difference in the writing skills of students compared to not using DST. The study observed that the writing skill of the DST students serves as a powerful tool in terms of the students' ability to express themselves, it might also contribute to their performance and the transmission of their knowledge in the learning processes.

Xu et al. (2011) has reported similar results in relation to digital storytelling efficacy in order to teach skills of writing. Through designing and producing realistic artefacts, Gakhar and Thompson (2007) state that digital storytelling develops opportunities for students to write creatively and organise ideas coherently. Moreover, digital storytelling, as Gakhar and Thompson show, can improve media literacy levels. Separately, Ballast, Stephens, and Radcliffe (2008) used digital storytelling to increase students' writing skills, as they analysed digital storytelling effects upon the writing skills and writing attitudes of sixth grade students. In that study, the control group converted a story that had been written in advance into a word document, and subsequently uploaded it to an online magazine for their class; while the experimental group crafted a digital story by using Photo Story. The researcher, at the end, interviewed students regarding their revisions during the process of developing digital stories. The interview data showed that, compared to the control group, the experimental group's students became more engaged in digital storytelling and provided more attention during the revision of their writing. The digital storytelling group edited their stories more diligently through the correct selection of appropriate words, change of sentence sequences, or removal of sentences. The traditional writing group edited their writing through spell check and word counts.

Multi-user virtual environments were evaluated by Warburton and García (2009), and specifically in Second Life, where they analysed the advantages of virtual environments. Initially, virtual worlds are able to assist in the visualisation and contextualization of objects that people cannot perceive due to distance and monetary restrictions, as well as those objects and scenarios that we are unable to be seen in reality. Secondly, various interactions occur, which include interaction through avatar-to-avatar and avatar-to-object forms. Thirdly, in order to demonstrate the sense of being in a virtual environment, the user is presented as an avatar through digital unconscious mediation. This experience of virtual world immersion is able to enrich the experience of learners. Moreover, ancient story telling is modernised through digital design. Furthermore, in order to present the story, it is necessary to add multimedia components, such as images, sound, music, and others. Meanwhile, software, such as Windows Movie Maker, Apple iMovie, and Adobe Premiere, is used to edit common digital storytelling. Nevertheless, the 3-D virtual world of Second Life helps create the maximum effect of multimedia, which can potentially employ

components, including 3-D objects, images (snapshots), sounds, videos, etc. Indeed, digital storytelling in Second Life adheres to the same form as general digital storytelling (Sanchez, 2009). The key difference, however, is that students can create an experience or a space where others are able to walk through their stories, instead of merely creating a video.

There has been minimal research into teaching writing within virtual environments, such as games and virtual worlds, even though the educational potentials are evident. Warren et al. (2008), analysed a multi-user virtual environment, which is known as Anytown, and was utilised to support the writing of students based on Problem-Based Learning. Through Anytown, learners need to act as cub reporters, where various mysterious events are embedded into this multi-user virtual environment (MUVE), which include burning buildings and strange lights coming from a river. From this, in order to complete their writing tasks, learners are required to investigate how these events are relevant and consequential. The findings demonstrated that learners are able to improve more through this process in their writing performance when compared to traditional writing. Additionally, a multi-player interactive game was developed by Mayo (2004), which is known as Story World Builder, and helps to motivate learners to improve their writing. Story World Builder develops learners to design and construct a virtual place as their stories' environment. Learners write their stories using transcripts that the program saves, after they have played active roles in the virtual environment as characters within a specific story.

2.2.4 Offline and Online Story writing Tools

Although the ultimate purpose of digital storytelling is to tell the story to the audience, story writing is also important. A good script makes the digital story more effective and successful. Robin (2007) stresses story writing, describing how people usually spend more "digital" time searching for images and audio files rather than on the story itself. In contrast, he emphasizes that the process of selecting a meaningful topic and writing the story about the topic is the most important process in digital storytelling. When students pay more attention to the writing process by applying the artwork, and to adapt and individualise it, they will have personal ownership of their stories. Also, student has the opportunity take ownership of the digital resources to create their own backgrounds by layering and scaling images, and to change the colour of characters' clothes and occasionally hair. This will increase the ownership, which users may take of their visuals, particularly by enabling them to make their own stories. Likewise, students will be motivated and engaged in the process of digital storytelling. In summary, although digital elements are important, writing should not be neglected, because it is an essential part of digital storytelling.

A variety of available offline and online tools can be used to create or write digital stories in education. Microsoft Photo Story 3, Windows Movie Maker and Apple iMovie are offline tools recommended for getting started with digital storytelling (Robin & Pierson, 2005). However, in DST studies, most researchers have conducted the studies on offline DST tools, despite other studies results showing that the integration of DST in an online environment can improve student motivation to a greater extent.

Many researchers have shown that recent storytelling systems are enhanced writing activities, especially for the digital age (Huffaker, 2003; Hull & Nelson, 2005; Olthouse & Miller, 2012; Yang & Wu, 2012). Storybird, StoryJumper and Tikatok are engaging story writing websites that have been suggested to provide supplementary material for promoting writing skills for young learners (Kuo, Chiang, & Lin, 2012). One study indicated that Storybird is considered the best tool in promoting writing skill based on six criteria: language learning potential, learner fit, meaning focus, authenticity, positive impact and practicality (Kuo, Chiang & Lin, 2012).

Storybird is a collaborative storywriting website that represents three ideas; creating, reading and sharing. It is a website for English native readers without tools that support writing such as online dictionary or spellcheckers. This collaborative storywriting website allows students to focus on their writing instead of drawing pictures. Students are provided with free artwork. When students choose any artwork , they can drag and drop pictures as well as create and write a story suitable with a chosen picture. Olthouse and Miller (2012) proposed that Storybird might be used as a creative writing opportunity in the classroom. Students can generate storybooks using Storybird graphics, they can print final copies, comment on others' writing and work with a partner to write a book.

The StoryJumper website focuses on learner writing skills to make their own storybook (Kuo, Chiang & Lin, 2012). The learner can share their stories and receive positive feedback. The website offers a huge choice of props and uses class management tools. Another example is Tikatok, which is a digital classroom environment to write the user's own digital book or stories (Sarıca & Usluel, 2015). The learner can use the available pictures or upload their personal pictures to create stories. The teacher has the opportunity to monitor the students' work. There are limited functions between peers, such as sharing stories in Tikatok (Kuo et al., 2012).

However, Some available tools such as Tikatok and StoryJumper (section 2.2.4) do not have features that support peers and parents interaction with children within the tool. Therefore, one of the components that need to investigate for including in the framework is social presence (peers and parents) and their interaction. Table 2-2 shows a summary of the comparison between the characteristics of some offline and online DST tools.

Based on the characteristics of online storywriting tools, no story writing tools support Arabic language. Moreover, there is no clear framework to motivate children in online storywriting tools. More importantly, the following questions need to be answered:

- What motivates children to write stories in online and offline environment?
- How does the interface design affect their motivation to participate?
- How can online storywriting tools be designed to be more motivating with respect to Arabic language?

Therefore, the next chapter will explore what can motivate children in Arabic story writing tools based on psychological, cultural, educational and technical perspectives.

Table 2-2 Comparison between the characteristics of offline and online DST tools

DST Tools	Offline tools			Online tools		
	Microsoft Photo Story	**Windows Movie Maker**	**Apple iMovie**	**Storybird**	**StoryJumper**	**Tikatok**
Characteristics						
Free cost	✓	✓	✓	✓	✓	✖
Supports Arabic language	✓	✓	✓	✖	✖	✖
Supports class management for teachers	✖	✖	✖	✓	✓	✖
Library to browse and search images by keyword	✓	✓	✓	✓	✓	✓
Parental reinforcement and monitoring	✖	✖	✖	✓	✓	✖
Drag and drop image, props within text	✖	✖	✖	✖	✓	✖
Upload image, props	✓	✓	✓	✖	✓	✓
Supports writing in many formats (more art, less text), (chapters, less art), (one image, select words)	✖	✖	✖	✓	✖	✖
Publish, share, print	✖	✖	✖	✓	✓	✖
Social feedback	✖	✖	✖	✓	✓	✖
Supports challenges	✖	✖	✖	✓	✖	✖
Badges	✖	✖	✖	✓	✖	✖

2.3 Summary

This chapter has discussed the definition and the importance of storytelling. Subsequently, the chapter has reviewed digital storytelling concepts and the effectiveness of DST in different cognitive structures; especially upon improving writing skills. Examples of online and offline DST tools have been discussed and compared based on their characteristics. Moreover, this thesis focuses on web-based story-writing tools, which are considered forms of online DST tools. As there is no story-writing tool that supports the Arabic language, and no clear framework in regards to children's motivational requirements through web-based story-writing tools, the following chapter will explore children's motivational requirements from various perspectives.

Chapter 3 Overview of Children's Motivation

The purpose of this chapter is to understand the requirements for motivating children that may be considered the core of motivation by viewing theories and studies that are linked to children's motivation based on psychological, cultural, educational and technical perspectives. In this study, motivation refers to the requirements that can be used to sustain and instigate goal-directed activities (Schunk et al., 2014). The structure of this chapter is illustrated in Figure 3-1

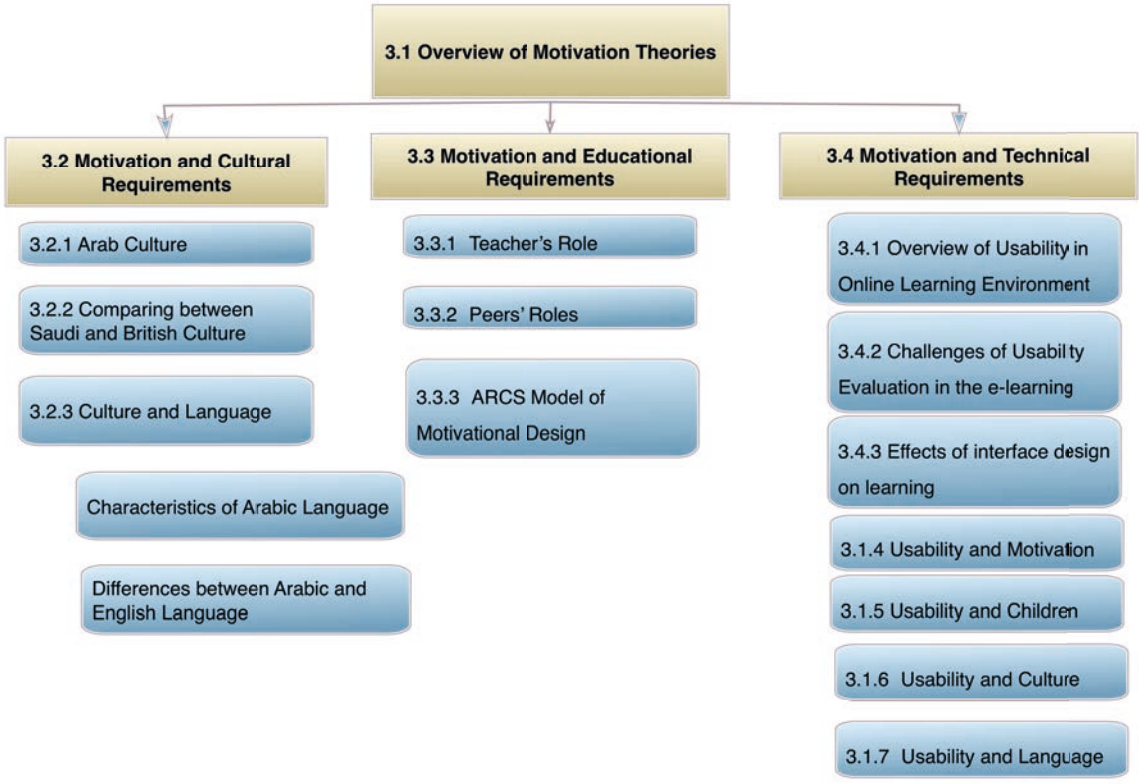

Figure 3-1 The Structure of Literature Review

3.1 Overview of Motivational Theories

This section provides a brief overview of several motivational theories to analyse motivation in education. Many theories have linked motivation with the internal state of learners. Behavioural theories consider motivation as reinforcement (rewards) to increase or sustain learner responding. Cognitive theories view presumption of learner's thoughts, beliefs and emotions that influence the motivation.

Up until the early 1960s, **Reinforcement Theory** was dominant in educational papers, and which conceived motivation in terms of observable behaviour. According to the theory, an individual has produced particular behaviour because they have been reinforced. Skinner (1974) assumed that

an individual's behaviour is determined by unpredictable events in the environment and their reinforcement history. An antecedent stimulus sets the occasion for behaviour responses to occur, which is followed by different consequences, as Skinner's (1953) operant conditioning theory demonstrates. What is more, the practices of praise, criticism, time-out, free time, rules, privileges, grades, and token/point system highlight how important motivational reinforcement and punishment is within a learner's schooling (see Table 3-1).

Table 3-1 example of Reinforcement and Punishment (Schunk et al., 2014)

Events	**Stimulus**	**Response**	**Consequences**
Positive Reinforcement (Present positive reinforce)	The teacher provides work to be completed by the students	A student continues to study	A teacher gives praise to a student following good work
Positive Reinforcement (Remove negative reinforce)	The teacher provides work to be completed by the students	A student continues to study	A teacher states that a student is not required to complete his/her work
Punishment (Remove positive reinforce)	The teacher provides work to be completed by the students	A student does not utilise his/her time	A teacher removes a student's free time
Punishment (Present negative reinforce)	The teacher provide work to be completed by the students	A student does not utilise his/her time	A teacher gives homework to the student

However, research has suggested that the reward must be used effectively and thoughtfully because the rewards and punishment techniques could negatively affect the child's behaviour and student motivation in the long run (Kohn, 1999; Lepper & Henderlong, 2000; Ryan & Deci, 2000; Stipek & Seal, 2001). Instead, theories have focused on extrinsic motivations, such as rewards or punishments, and neglected intrinsic motivations, such as beliefs, values and needs (Graham & Weiner, 1996). Therefore, any effort to explain, predict and influence motivation could be measured by the behaviour and examine the concerns of current and desired behaviour.

Cognitive theorists were not satisfied with the theory around observable behaviour and they began to study the achievement from psychological variables, such as beliefs. Moreover, they saw that the expectations and beliefs mediate the reward effects, but the rewards do not influence the behaviour achievements. For instance, they ascertained that learners work hard due to their prior knowledge and expectancy to be rewarded in the future, and not for the reason that they have been rewarded for previous hard work. Thus, cognitive motivation theorists attempt to

influence the behaviour achievement by influencing students' belief about the consequences of required behaviour.

Atkinson (1964) added **task values** to the beliefs as another variable that explains the achievement behaviour. In his theory, he confirmed that the task required more than expectation to complete it; value should be involved in the task. Atkinson studied the task value narrowly in terms of success and avoidance of failure. In other words, other researchers have considered value from another point of view, such as the student's perception about the importance of academic achievements or the importance of achievements in their lives outside school (Eccles et al., 1983). Therefore, teachers and researchers can predict and change the behaviour by measuring student perceptions towards the value of rewards.

Intrinsic motivation theorists expanded the cognitive aspects of motivation to include the emotional aspects. White (1959) assumed that the individual motivation is inherited to enhance their intellectual activities and competence, and that they enjoy their accomplishments. In theory, the pleasure is a part of the value of achievements; to attain a high level of understanding, or mastery. Theorists have suggested two factors, competence and autonomy, that can increase people's intrinsic motivation to engage in intellectual tasks. As regards the former factor, researchers have shown that the students who feel they are competent in school tasks are more likely to intrinsically engage in similar tasks, and even in the opposite way (Gottfried, 1990; MacIver et al., 1991; Harter, 1992; Skaalvik & Rankin, 1995) . Moreover, there is another perspective of information processing among scientists who agreed with competence motivation. They assumed that the pleasure is derived from investigating, creating, or processing stimulus that offer a challenge (Spielberger & Starr, 1994). Later factors on intrinsic motivation have been derived from self-determination theory. The research proposed that people want to engage in task activities by their own choice without any control from outside (Deci & Ryan, 1975; DeCharms, 1976; 1984; Ryan & Deci, 2000). Therefore, intrinsic motivation theorists could use those factors to examine the effectiveness, to determine the intrinsic interests in various studies and, then, manipulate those factors to increase their engagements.

Whilst the intrinsic motivation theory has been concerned with people's feeling of enjoyment, **self-value theory** emphasises human beings feeling of being valued. A fundamental assumption of self-worth theory is that people are naturally motivated to preserve a sense of personal worth (Covington & Beery, 1976;Covington, 1984;1992; 1998). For example, the student will attempt to demonstrate their competence in an educational context, if they believe that their value is based on academic competence. Other researchers agreed that a feeling of personal worth, as well as the emotional experiences, plays an important role to achieve outcomes associated with

competence or incompetence (Covington & Omelich, 1979a; 1979b). Therefore, theorists of self-value will assess student beliefs about what others' esteem is based on.

Self-system theorists are also concerned with emotion and have studied the feeling of being socially involved. Many studies have examined the effects of students' relationship with teachers and their peers on motivation. Skinner and Belmont (1993) have shown that good relationships with the teacher have had positive effects on students' learning behaviour. Another study also indicated that the more students emotionally have a sense of belonging socially, the more they are cognitively, behaviourally and emotionally motivated in the classroom (Connell & Wellborn, 1991). Therefore, enhancing the feeling of relatedness to the students is associated with the teacher's involvement, which positively influences student engagement in classroom.

Goal theorists believed that all students engage in the same behaviour for different reasons, and the nature of students' goals could influence how they do tasks and what they learn. **Goals theory** distinguishes two different types of goals, learning goals and performance goals (Dweck, 1986; Ames, 1992; Lepper & Henderlong, 2000). Learning goals are directly related to the students' intrinsic value to develop their skills, while performance goals are related to extrinsic rewards to perform better than others. Other researchers, however, have found that some students often have neither learning goals nor performance goals and that they are motivated to avoid academic tasks (Eccles et al., 1998). As this section has demonstrated the motivational theories, the next section will explore cultural requirements that can motivate children.

3.2 Motivation and Cultural Requirements

Cultural differences are often found in motivation variables. The attitudes, beliefs and practices of cultures must be explored to enhance children' motivation. Therefore, it is important to examine potential cultural differences in motivation to add to our research base and to offer implications for designing storywriting tools that take into consideration Arab culture.

Regarding goal theory, it is possible to evaluate whether students from different cultures have the same level of concern in relation to being competent in front of others, attaining a better performance than their peers, and determining academic and social aims, as shown by McInerney et al. (1998). Their study analysed three groups of Australian high school students: Anglo Australians, Aboriginal Australians, and immigrants Australian performance, in order to determine their mastery and social goals. It could be seen from the findings that all the groups were similar regarding goal beliefs; the greatest emphasis was on satisfying mastery requirements; the adherence to social performance, while goal needs were perceived to not be as important. The aboriginal Australian group was less individually oriented than the other two groups, which can be

seen as indicative of aboriginal families who focus more on traditional values, such as affiliation and social concerns. Therefore, it is not surprising that they would ascribe greater value to the goal. This example is mentioned to understand how culture is considered an important factor that can motivate children.

To better understand motivation among children in specific culture, there is a need to focus more strongly on culture characteristics and context. Therefore, the next section will discuss the nature of Arab culture and what are their requirements.

3.2.1 Arab Culture

In comparison to Western cultures, Arab culture has many differences in relation to traditions, language and religion. Research was conducted by IBM employees from 40 countries, which included seven different Arab nations from the Middle East: Saudi Arabia, Egypt, Iraq, Kuwait, Lebanon, Libya, United Arab Emirates (UAE) (Hofstede, 1984, 2005) which produced five factors for people from specific national cultures. Hofstede showed that the fundamental problems that all societies encounter are: firstly, the connection between individuals and community; secondly, society disparity/inequality; thirdly, gender social consequences; and, fourthly, how to deal with social uncertainty that is inherent in both economic and social existence. The analysis defined the following national cultural dimensions:

Power Distance (PDI) – The level and how society accepts class differences;

Individualism (IDV) – The level and how the individual is valued less than the overall for the welfare of the group;

Masculinity (MAS) – Motivation to achieve, as well as value in competition and materialism;

Uncertainty Avoidance (UAI) – The tolerance of uncertainty and risk; and

Long-term orientation (LTO) – The preference towards stability, conservation, traditional respect, and orientation towards the future (Hofstede, 2005)

In general, Hofstede (2010) argued that Arab people have a high power distance (80). Furthermore, the uncertainty avoidance is also high (68) whilst individualism is low. Due to there be common similarities between Arab countries such as traditional, cultural, linguistic and religious factors, this study is focused on the Saudi culture specifically. The next section will compare Saudi with UK culture

3.2.2 Comparing Saudi and British Culture using Hofstede's Dimensions

Saudi Arabia and the UK have very different scores in both power-distance and individualism. Power-distance relates to how much people respect authority. High power-distance represents a society that does not conceptualise power as being distributed equally, but, instead, places individuals into ranks of worthiness (Hofstede, 2016). These societies have low social mobility, as it is not expected for people to aspire to be more than the position into which they are born. This is often balanced by low scores regarding individualism (Hofstede, 2005). In collectivist cultures, such as Saudi Arabia, people tend to act in the interests of the group as a whole rather than pursuing their own self-interest (Hofstede, 2016). People see themselves as being part of a common goal. The United Kingdom is precisely the opposite: people can aspire to be what they want to be, and are encouraged to pursue those goals by any means necessary (Hofstede, 2016). Figure 3-2 shows the Hofsted's cultural comparison of Saudi Arabia and the UK.

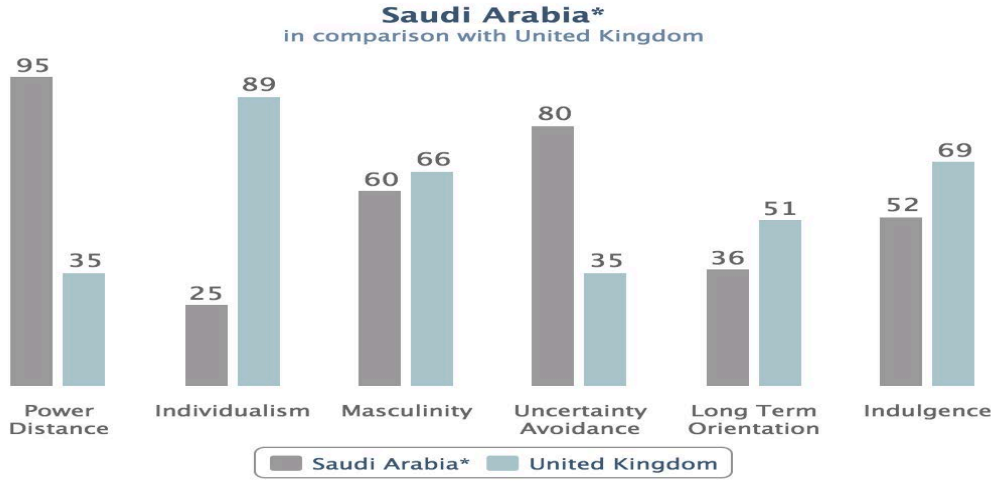

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Figure 3-2 Hofsted's cultural comparison of Saudi Arabia and the UK (Hofstede, 2016)

3.2.3 Culture and Language

The correlation between culture and language is significant, as language is utilised in order to produce cultural bonds. It is a challenge to study particular cultures without the consideration of the native language that is spoken within it, while there is no language that is able to be analysed separately from the culture where it is spoken (Witherspoon, 1980). Hence, the knowledge of a language makes a culture and its people more comprehendible. Downey et al. (2005) states that people may still speak different languages, even if people grow up in similar cultural situations. As a result, people may have different views and opinions, even though they share the same culture, due the different languages. The most interesting finding they reached was that cultures with high power distance indicators tend to have more collectivist rather than individualistic tendencies.

Therefore, culture is dependent on language, and thus, the language, culture and communication are all connected together. Accordingly, no language exists without culture; while there is also no communication without the centralization of culture. Culture integrates with language. Language is the prerequisite of social formation and development. Without language there would be no culture. Language emerges and develops to meet the demand of communication and culture transmission (Pan & Cao, 2010). Language is a symbolic system of culture that has been described as an important aspect of social life, which is similar to art, law and religion (Pan & Cao, 2010).

A person who speaks in other than their own native language develops opinions and a personality that alters depending on the spoken language of a specific moment. Thus, a human's personality can be affected by language. Hillier (2002) shows that the cultural context of that language is vital when learning any language. Subsequently, the next section presents Arabic language characteristics in relation to Arab culture and how it contrasts to Western cultures and the English language.

3.2.3.1 Some Characteristics of the Arabic Language

Arabic language, the mother tongue of more than 350 million people. Arabic alphabets consist of 28 letters to represent 34 phonemes (Elbeheri, Everatt, Reid, & Mannai, 2006). However, Some linguists consider 'hamza' or 'ء' one of the Arabic letters. In this case, Arabic letters consider 29 letters instead of 28 letters in the Arabic writing script, whereas others consider it an accent mark because it represents two phonemes, both silent and spoken (Elbeheri, 2004). Character shapes are consistent in the text, which means that there are no upper or lower case differences. Moreover, the implications of a bidirectional language, such as Arabic text, suggest that, whilst numbers are written from left to right, the text is written from right to left (Al-Wabil, Zaphiris, & Wilson, 2006).

Arabic sentences can take the form of a verbal sentence, which characteristically begins with the verb, or a nominal sentence, which usually commences with the noun (Al-Muhtaseb & Mellish, 2008). Morphology and syntax (diacritical mark) encompass the two classes of Arabic Grammar. Morphology refers to the form of the word and its derivative, which gives it meaning. The syntax is based on letter ending of words and its position in the sentence.

The sentence consists of a group of words, inclusive of particles, nouns and verbs. Particles consist of more than one letter, which could be alphabetic, a letter of extra meaning or connection (Al-Muhtaseb & Mellish, 2008). These are called letters of significance, which present meaning when written along with nouns or verbs. More than one particle has the same meaning and one particle

can have different meanings. They give an appropriate diacritical mark to the last letter of the word after them, such as the particles of the Jarr, which gives <kasra> to the word next to it.

The noun is the word which indicates a meaning in the word itself, and is not associated with time. There are two kinds of nouns, variable and invariable (Al-Muhtaseb & Mellish, 2008). The variable noun includes nouns that can be plural, dual, diminutive and relative. An invariable noun includes personal, demonstrative, conditional, conjunctive, allusive, circumstantial, verbal and numeral nouns.

The verb represents the past, present, or future actions. Arabic verbs are derived from three letter roots which change slightly to indicate who is doing the action, and when they are doing it, which is called conjugation. Conjugated verbs include person, gender, number and tense specific, which means these conjugated verbs correspond to a specific pronoun and state when the action occurred in the past or present (Al-Muhtaseb & Mellish, 2008). There are two main tenses present (now), or the past (before now). The future tense is viewed as an aspect of the present, and not as a tense.

Other features of Arabic script are cursive styles, which join more than two characters with ligatures to build one word. Letter shapes are different based on their positions in the word (initial, middle and last, or isolated) (Elbeheri, 2004). Twenty-two letters can be connected in two-ways (both preceding and following) and only six letters can be connected in one-way (only preceding) (Elbeheri et al., 2006). Those six letters of one-way connectors can create one or more spaces in the same word. However, this is considered an issue in Arabic orthography in order to clarify word boundaries (Al-Wabil et al., 2006; Elbeheri et al., 2006; Hifny, Qurany, & Hamid, 2002). Moreover, an identification letter, ‘al’, works as the indefinite article in the English language, ‘a’ and ‘an’, which represent two kinds of phonemes, salience and spoken, based on the word in context.

The most significant characteristic of Arabic language is orthography. There are two types of orthography: with diacritics (shallow) or without diacritics (deep) (Al-Wabil et al., 2006; Mahfoudhi et al., 2011). Shallow orthography is used for children’s books, textbooks for foreign learners and formal books such as the Qur’an, to easily follow and decode letter-to-sound correspondences. Short vowels are represented as diacritical marks in shallow orthography, which appear above or below letters to facilitate pronunciation of the words. However, the majority of online content uses deep orthography because shallow orthography requires great effort from the developer and high linguistic skills, especially in diacritics (Al-Wabil et al., 2006). Deep orthography is homographic, which means the same word can have more than one meaning, and more than one pronunciation, because it appears non-vowelised.

Morphology plays an important role in assisting readers with the pronunciation of words. Arabic morphology is highly inflected, and is derivational morphology, which provides clues to orthographically-correct spelling (Elbeheri et al., 2006). However, Arabic morphology could include difficulties for the reader and writer because of its complexity (Elbeheri et al., 2006). In addition, each gender has different written and spoken words, which make Arabic a gender-specific language (Al-Wabil et al., 2010).

3.2.3.2 Some Differences Between English and Arabic

The Arabic and English writing systems are very different. Many linguistic researchers have identified the differences between the two languages (Al-Muhtaseb & Mellish, 2008; Alrowais, Wald & Wills, 2013; Dajani & Omari, 2013; Smith, 2001). The following table presents a summarisation of the most important features and issues between Arabic and English, as detailed in Table 3-3.

3.3 Motivation and Educational Requirements for Children

This section involves psychological, sociological, and educational research to understand how motivates children to do task. In particular, how children are socialized to do tasks by getting help from teachers and peers. There are studies related to the characteristics of classroom (e.g., activity design, goal orientation, type of task) to get help. Studies also determined students' personal characteristics (e.g., achievements level, personal goals, self-perception ability) that predict the individual who is likely to ask for help and those who do not.

The two basic theories named sociocultural theory (Vygotsky, 1978) and self-system theory (Connell, 1990) are integrally linked to social experience. First, Vygotsky' theory focused on child cognitive development which is linked to the interaction with more knowledgeable social partners. The child is an active participated in social interaction with others partners within a sociocultural context. When the child enters school, the interaction with teachers and classmates becomes important. The child needs to be provided with assistance, coaching, questioning, and guided participation as a form of scaffolding. On the other side, the more knowledgeable peer or teacher needs to monitor the child and support the child's needs. In self-system theory (Connell & Wellborn, 1991; Connell, 1990; R. Ryan & Deci, 2000a), children have three psychological needs to underline self-regulated learning. These needs are relatedness, autonomy, and competence. Therefore, in order to support the development of self-regulatory strategies, there are needs to provide children with three important tasks: involvement, support of autonomy, and support for the development of competence.

Table 3-2 The summary of Arabic and English language

Writing skills features		Arabic	English
Orthography		Transparent (shallow) and non-transparent (deep)	Non-transparent (deep)
Grammar	Sentence Structure	Has both nominal (two nouns, no verb) and verbal sentences Verb first followed by the subject. V + S + O/C	Has verbal sentences Subject then verb S + V + O/C
	Verb to be	No	Yes
	Has Past tense form	Yes	Yes
	Has Present tense form	Yes	Yes
	Has Future tense form	No	Yes
	Has Model verbs	No	Yes
	Indefinite Articles	No	Yes
	Irregularity of conjugation of verbs	Yes	No
Punctuation		Yes	Yes
Morphology		Inflectional and derivational morphology	No
Inclusive of diacritical marks		Yes (14 diacritic marks signify the diminutive vowels)	Used for a few words
Cursive form (The letters being combined to one another through ligatures)		Yes	Yes (But rare use and has another disconnected form)
Dissimilar methods for each letter		Yes (Each letter has two to four forms: initial, medial, final, isolated)	No
Comprises of numbers with comparable shapes and the modification is only in the direction		Yes	No
Preserve morphology at the cost of phonological transparency		Yes	No
Language-specific to gender (Verbal commands differ for each gender)		Yes	No
Direction of writing		Bi-directional (Right to left for text and left to right for figures)	Left to right
Includes disconnected letters		Yes (6 letters have one-way connecting)	Yes (All the letters are disconnected)

3.3.1 Teacher's Role

Based on self-system theories, teachers play an important role in three ways (Skinner & Belmont, 1993; Skinner, Wellborn, & Connell, 1990). First, teachers participate with their students and establish personal relationship to facilitate student and teacher communication. Second, teachers cooperate with their students in the classroom context. In this case, student willingness to ask for assistance from teachers and classmates is required to achieve academic goals that support autonomous learning. Third, teachers organized classroom activities in ways that help children to develop questioning, experience academic competence, establish relationship between help seeking and success. So, teacher involvement affects different dimensions such as emotional engagement (e.g., liking, appreciating, enjoyment of the student), behavioural engagement (e.g., aid, time, energy), and achievement (e.g., understanding of student' personal and academic needs) (Archer & Ames, 1988; Birch & Ladd, 1996; Covington, 1992; Skinner et al., 1990; Wentzel, 1996, 1997).

Children's autonomy can be supported through a classroom environment that has teachers who facilitate students' self-regulated learning. As Ames (1992) states, learning goals need to be fixed into the design and structure of a student's learning environment, which develops self-regulated learning and student autonomy. The success of this approach relies upon effort with a classroom that instils learning goals, task-involved or mastery objectives. It is imperative that teachers focus upon long-term mastery and autonomy, as these progress students who are provided with performance feedback that is supportive of each student's development, both intellectual and social development. The success of this process is dependent upon the students' abilities, as performance goals direct the class, which can also relate to ability or ego-involved objectives. Accordingly, students are provided with performance feedback that focuses upon social comparisons with their peers, which stresses the importance of being judged competently and attaining good grades (Archer & Ames, 1988; Nicholls, 1979)

Comparatively, however, it is vital to consider students' personal goals, as studies have shown that personal academic goals can be distinguished between intrinsic and extrinsic orientations, which compare conceptualisation and learning/performance objectives (Ryan & Deci, 2000a). In particular, Harter (1981) differentiated among three specific components of intrinsic compared to extrinsic orientation. In regards to intrinsic orientation children: aim to achieve independent mastery; prefer academic challenges; and demonstrate curiosity and academic interest. Contrastingly, in relation to extrinsic orientation, children: are dependent on their teacher; have a

preference for easier assignments; and complete their schoolwork in order to satisfy their teachers and attain quality high grades.

Self-regulated learning depends upon students possessing both perceived academic competence and perceived control, as a self-system model of motivation shows (Connell & Wellborn, 1991; Skinner, 1995). Additionally, teachers commonly employ different forms of activity structures within their classrooms, which include individual, whole-class, and small-group activities. A variety of different rules and expectations, which could be either explicit or implicit in regards to instructions, classroom management, student–teacher interaction, and communication among students relate to each form of activity. Nevertheless, due to the forms of tasks that are typically assigned, which include worksheets, silent reading, or reviews, teachers normally want their students to not require assistance during their individual activities (Van der Meij, 1988). In comparison, Due to that the mastery of the material is normally cannot easily be achieved throughout the process of whole-class activities, teachers encourage students to ask questions. However, it is necessary to remove potential embarrassment that can function negatively against question development when social comparisons are implemented too often (Dillon, 1988; Karabenick & Knapp, 1988).

Small-group activity, which is the third form of classroom structure, is designed in order to motivate and develop children's interaction through individual requests and assistance development (Nelson-Le Gall, 1992; Webb & Palincsar, 1996). Extensive research has been undertaken in regards to academic assistance, which seeks to incorporate small-group work and collaborative activities, as this promotes the relative frequency of requests for assistance. In comparison to those students who work individually or in whole-class activities, students working in small groups commonly attempt to gain help from peers and their teachers (Meece, Blumenfeld, & Puro, 1989; Nelson-le Gall & Glor-Scheib, 1985; Newman, 1991).

What is more, teachers should bring their own individual resources to classrooms (e.g. academic strengths and interests with care), as well as innovative classroom management and instructions to adhere to formal curriculums, which can potentially influence students' attitudes and skills regarding seeking assistance. Students may also be helped to think and ask questions through teachers asking their own questions, which help students to diagnose misconceptions, which equally support self-monitoring. Furthermore, it is important that the appropriate time for questions is implemented, in order to think when it is necessary for the successful completion of tasks.

By providing students with specific forms of performance feedback, teachers can often influence the process of seeking assistance. Additionally, useful models for self-regulation can be provided

through interactive and instructional feedback, as research has demonstrated that feedback maximises intrinsic motivation, and thus, supports students' continued effort even when tasks are difficult. Specifically, it is necessary: to provide guidance instead of answers when students provide incorrect answers; to provide encouraging comments that are directed personally to the students, focusing upon strengths and weaknesses in performance, and not upon global assessments; and by utilising student progress reports that are individualised instead of standardised grades (Butler, 1987, 1988; Maehr & Anderman, 1993).

Research has found that school-level characteristics such as school climate and safety, curricular differentiation and academic tracking, school size and configurations, student composition and access to extracurricular activities, can influence student motivation (Eccles & Roeser, 1999). Other researchers have highlighted the significant influences of school culture and organisation on student motivation. Figure 3-3 shows the conceptual framework for schools and organisations derived from Maehr and Midgley (1991) and Lee et al. (1993). The framework displays the external constraints that influence school culture and organisation, teacher and student outcomes.

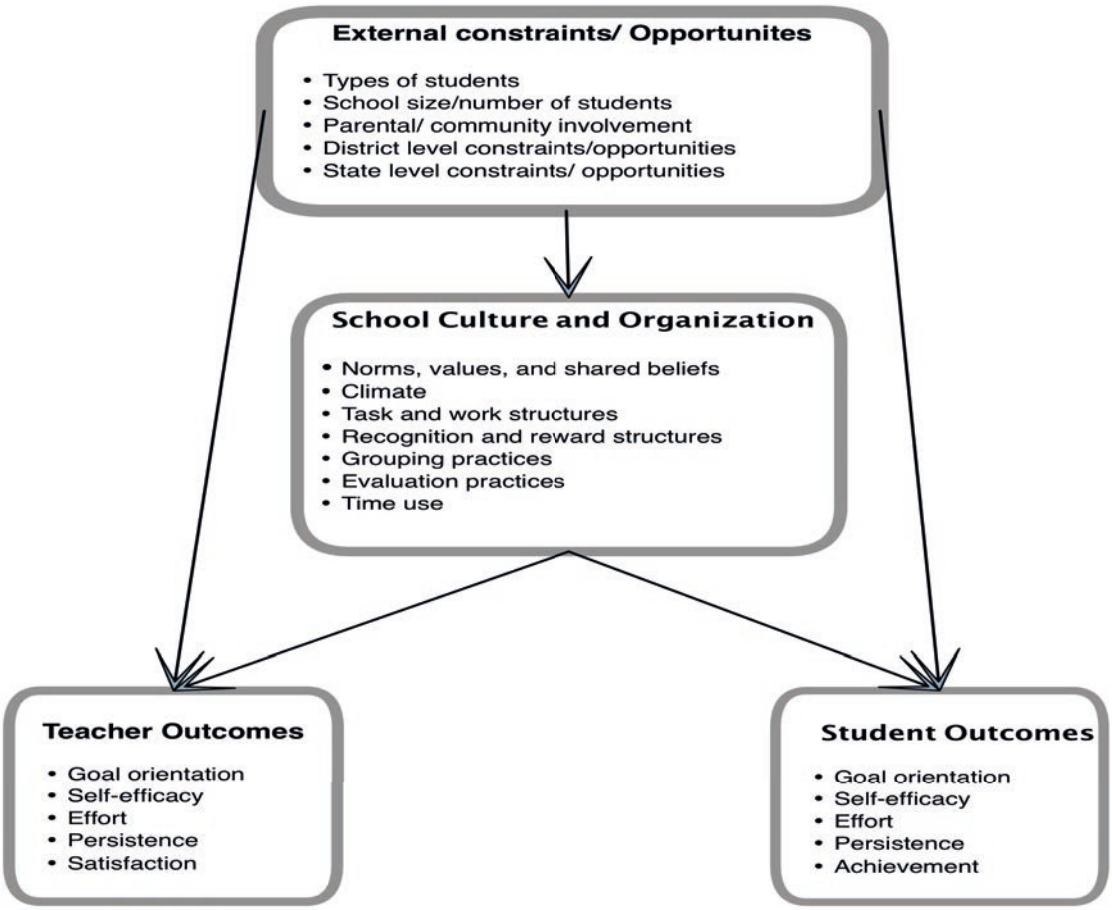


Figure 3-3 Conceptual model for school culture and organisation derived from Maehr and Midgley (1991) and Lee et al. (1993).

Special focus will be on the relation between the components of school culture and organisation and teacher and student outcomes. All components of the school culture and organisation should be included in the climate of a school (Schunk et al., 2014), which are: sense of community, warmth and civility, and feelings of safety and security (Schunk et al., 2014). Much research has proposed principles to guide and develop school organisation, curriculum, and staff and which reflect an emphasis on student motivation (Muncey & McQuillan, 1993;Schunk et al., 2014). These principles are shown in Table 3-4.

3.3.2 Peers' Roles

Peer interactions in the classroom are both academic and social, although the specific focus here is upon how the development of classmates' help-seeking skills and attitudes are enhanced. Even though Connell's (1990) model of self-system processes in relation to involvement, autonomy, and competence that has not been applied directly to peers as socialisers, connections are evident that potentially prove valuable in progressing the comprehension of self-regulatory development processes which are involved in adaptive assistance seeking. Firstly, relationships among peers provide an interpersonal context, which can either support or undermine the collaboration levels of children. Secondly, it is evidently natural for children to compare themselves academically with their peers, which can prove negative upon competence and self-worth, as social comparisons generally undermine students, which results in a reduction in assistance seeking. Thirdly, particularly during collaborative activities, children talk amongst their peers, which promotes the possibility to advance questioning skills that are in assistance seeking.

Table 3-3 Principles and guidelines for school reform derived from Muncey and McQuillan(1993)and Schunk et al. (2014)

Principles and guidelines for school reform
• Develop common school norms, values and shared beliefs
• Create a school climate of good collegial and personal relations
• Foster a sense of school belonging or connection
• Develop smaller learning communities within large school environments
• Design task and work structures to foster engagement and student autonomy
• Design authority and management structures that allow for choice and control
• Provide opportunities for all students to be recognised and rewarded
• Provide grouping arrangements that foster student interaction
• Focus evaluation practices on progress and improvement
• Manage time use to facilitate changes in school culture and organisation

Students influence one another in a variety of ways, as school children spend extensive time daily with their classmates, and have constant interactions (Berndt, 2008). Studies have helped to show, as will be discussed further below, how students' school adjustment levels are influenced by their interaction with peers, which involves how friendships and social goals develop, and how assistance seeking progresses from this.

For students of elementary and middle schools, friendships that are deemed to be beneficial are when help and support characterise them, together with certain other features that assist in mediating students' efforts in assistance seeking, such as: affection, companionship, intimacy, self-disclosure, reliability, and conflict diminution (Buhrmester, 1990; Buhrmester & Furman, 1985). Students generally become more engaged in classroom learning and achieve better academically when their friendships satisfy their own personal requirements (Berndt & Keefe, 1995; Birch & Ladd, 1996; Parker & Asher, 1993). Through time, students are able to achieve their goals and improve their attitudes, as they gain value for schoolwork, while developing through the aid of their friends. Specifically, peer assistance seeking among 3rd to 5th Grade students was examined in both mainstream and self-contained special education classrooms, as familiarity among students tends to vary (DeCooke & Nelson-Le Gall, 1989). Assistance seeking and requesting additional information was more likely to be successful following a development in greater inter-student familiarity and friendships, and thus, this becomes more likely to be positively reinforced as a vital strategy to advance academic challenges. Nelson-le Gall and DeCooke (1987) also suggest that the familiarity for children's initiation in help-seeking requests among 3rd to 5th Grader students shows that classmates normally help from the same sex on a more regular basis.

Social affiliation is imperative for students who have been successful at acquiring new friends and maintaining friendships, as they adjust well at school (Birch & Ladd, 1996; Ladd, 1990; Parker & Asher, 1993). Social affiliation includes the desire for friendship and intimacy; as well as social status or the desire for peer approval. Moreover, the goals of social affiliation can be positively related to the willingness to approach peers to improve academic assistance. Among 5th Grade students, there is an improvement in confidence when the children feel a higher level of social affiliation with their peers, which results in more use of questions when academic difficulties are encountered (Ryan, Hicks, & Midgley, 1997). Evidence demonstrates that children who place importance in maintaining friendships perceive assistance seeking to be a valued classroom activity, as social affiliation goals are unrelated to the measure of perceived costs, such as embarrassment levels. It is also possible that reciprocal peer interactions, where help is received and distributed, can be viewed as a form of bridging or potentially combining different social and academic goals. In particular in regards to the important of maintaining friendships for certain

students, this is potentially true, as it promotes peers' assistance provision, while simultaneously gaining help from competent individuals. Furthermore, in a study of 6th Grade students who work in small and collaborative groups in classes of Mathematics, it was noted that when students become more engaged in group work, they are more likely to interact with their classmates, and the more they report assistance seeking from group members (Newman & Gauvain, 1996).

Students are commonly motivated by a desire for social status, as well as gaining social affiliation. In Grade 5, according to Ryan et al. (1997), students become more concerned about embarrassment in relation to speaking in front of their peers, which results in refraining from seeking assistance, when they feel social approval from classmates to be important. Indeed, there are several relevant factors in regards to the moderation in the role of social status upon help seeking, such as a child's self-worth and the sense of social approval from the peer group.

Children, within the majority of classrooms, gain various opportunities to compare academic performance against their peers, which can serve numerous functions in relation to assistance seeking skills' and attitudes' development. Firstly, social comparisons can provide children with performance feedback, which is imperative to develop an understanding of the need for assistance, and when. Secondly, social comparisons generally deter children from revealing their own personal requirements in public, due to feelings of incompetence and a lack of self-worth. Both of these factors can influence a student's level of assistance seeking, even though teachers are normally able to influence the extent to which they are emphasised.

When social comparisons are presented in a constructive and non-judgmental manner, levels of confidence can be improved, as by helping children to start thinking about their own effort levels can make them develop better judgement on when to ask questions (Nelson-le Gall & Scott-Jones, 1985). Additionally, social comparisons are important when elementary and middle school students compare academic performance levels with their peers and start to conclude that others require assistance, which results in potential costs of embarrassment becoming minimised (Newman & Schwager, 1993). Therefore, a peer's ability to develop into an effective assistance provider improves when social comparisons constructively advance students' competence levels (Frey & Ruble, 1985; Ruble & Frey, 1991).

Specific factors within the classroom can either convey support or undermine students' autonomy and self-determination, due to the levels of salience and meaning of social comparison they progress. Children tend to feel more comfortable when they approach classmates and request their own assistance, which improves intrinsic motivation, learning goals, and individualised grading methods. Comparatively, children generally fail to share their problems or challenges with their peers when classrooms focus on extrinsic motivation or performance goals and norm-

referenced grade systems (Butler, 1987; Deci & Ryan, 1985; Ryan & Stiller, 1991). In relation to norm-referenced grade systems, social comparisons can have potentially negative implications in regards to children's competence and self-worth levels. In particular, students beyond 2nd Grade become more concerned regarding negative reactions to assistance seeking from their peers more than from teachers (Newman & Goldin, 1990). It was also determined by Newman and Goldin (1990) that this was especially evident among 4th-grade girls and both sexes in the 6th grade. Thus, it appears that girls often develop this fear level of embarrassment at an earlier stage than boys. However, Wintre et al. (1988) states that factors, such as familiarity with helpers may be particularly important in reducing these fear levels in girls.

Peers are generally able to provide invaluable sources of information and encouragement to each other, assuming that the organisation of the classroom enables this; for instance, if it is possible for a student to ask classmates instead of the teacher through small-group collaboration, then engagement is promoted. Children are particularly likely to experience academic and social benefits of learning through the process of collaboration. Accordingly, there are higher levels of sociolinguistic incompetency in collaborative learning in younger children (see Tudge & Rogoff 1989, Ellis & Gauvain 1992, Tomasello et al. 1993). Collaborative activities are designed to provide students with the opportunity to ''think in public'' and to exchange their aims, thoughts, hypotheses, strategies, and other sorts of ''interpretive talk'', which is developed in the academic stages of upper-elementary and middle-school (Cooper, 1980; Rogoff, 1998; Teasley, 1995).

3.3.3 Parents Role

Parents and family are the center of attention and concern. Parents also have a critical role in children's motivation. Parental influences on children's motivation can be affected by other factors, such as socioeconomic status, home environment, parenting style and interaction (Schunk et al., 2014). Socioeconomic status (SES) includes financial and material resources (income), human resources (parental education) and social resources (social network). Evidence shows that the child with higher SES will achieve well in mathematics and reading compared to a child with lower SES (Crosnoe & Pierce, 2011). Studies found that the child's intellectual development, self-efficacy and mastery of motivation can be nurtured by parents who provide a warm, responsive and supportive home environment, encourage exploration, stimulate curiosity, and provide play and learning materials (Pomerantz et al., 2005; Wigfield et al., 2007).

Parenting style and interaction also influence children's motivation. Four types of parenting style and interaction are identified, which are Authoritarian, Authoritative, Permissive-indulgent and Permissive-indifferent (Schunk et al., 2014). Table 3-2 clearly shows the characteristics of each style. Research has demonstrated that children's academic motivation is improved when parents

allow children to have input into decisions, state expectations as suggestion, acknowledge childrens' feelings and needs, and provide children with alternatives and choices (Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987). Positive influences of authoritative parenting results in benefits for children across different ethnics groups (Dornbusch et al., 1987). Moreover, to determine the effect of parent- child interaction on children's motivation, Newman (2000) stated that parents who give their child hints and prompts rather than immediately give them the answers, encourages their child's critical thinking and questioning. This situation is found more often among children higher in motivation. Therefore, school culture, teachers, peers and parents play important role in children's motivation to do tasks.

Table 3-4 Parenting Styles and Characteristics (Schunk et al., 2014)

Parenting style type	**Characteristics**
Authoritarian	High control, low responsiveness, low nurturance Sets rigid rules and uses strict discipline to assure compliance Little authority and opportunity to negotiate decision
Authoritative	Sets clear standards and limits for behaviour, but provides rationales for rules and decisions, Communicates more openly or child is encouraged to take responsibility and to regulate themselves
Permissive-indulgent	Highly responsive to their children but places few demands on them, rules are not consistently enforced and children are left to regulate their own behaviour
Permissive-indifferent	Emotionally detached and not involved in their children's' lives

Another motivation theory that has been applied into many educational studies to solve motivational problem, is the ARCS model of motivation design (Bolliger, Supanakorn, & Boggs, 2010; Di, Blanca, & Delgado, 2013; B. Huang & Hew, 2016; Huang, Huang, Diefes-dux, & Imbrie, 2006; Rodgers & Withrow-Thorton, 2005). The following subsection will discuss ARCS model to understand the factors that influence a learner's motivation to learn.

3.3.4 ARCS Model of Motivational Design

The ARCS model is derived from expectancy-value theory, reinforcement theory and cognitive evaluation theory and developed by (Keller, 1987a,; 1987b; 2009). This model contains four categories of motivational factors: attention, relevance, confidence and satisfaction.

- A (Attention) The process of capturing a learner's attention and giving a suitable response to the learners on specific instruction in order to maintain the learner's motivation.
- R (Relevance) – Mapping the personal needs/goals of the learner or learning experience to the current learning instruction.
- C (Confidence) – helping the learners to believe in achieving positive learning outcomes. There is a high opportunity of accomplishing something with some effort.
- S (Satisfaction) – A learner's satisfaction after completing a task and motivation arises if the learner is given reward (internal and external) at the end of the lesson.

The ARCS model was created to try to understand the factors that influence a learner's motivation to learn. This model has been designed to influence student motivation in traditional learning and face-to-face interaction between teacher and student. It has been validated in many studies, at all educational levels and in various cultures. Moreover, it has been applied and tested in different contexts, such as computer assisted instruction and distance education (Bolliger et al., 2010; Di et al., 2013; Huang & Hew, 2016; Huang et al., 2006; Rodgers & Withrow-Thorton, 2005). The ARCS implementation is mostly found in the educational games application, particularly in learning by using an instructional strategy. It is designed to create a more attractive learning environment and to enhance a learner's motivation, thus maintaining the learner's engagement throughout the learning session (Hung, Lee, Chao, & Chen, 2011). Figure 3-4 illustrates Keller's ARCS Model and their components. The next section will discuss motivation and technical requirements in online learning environment.

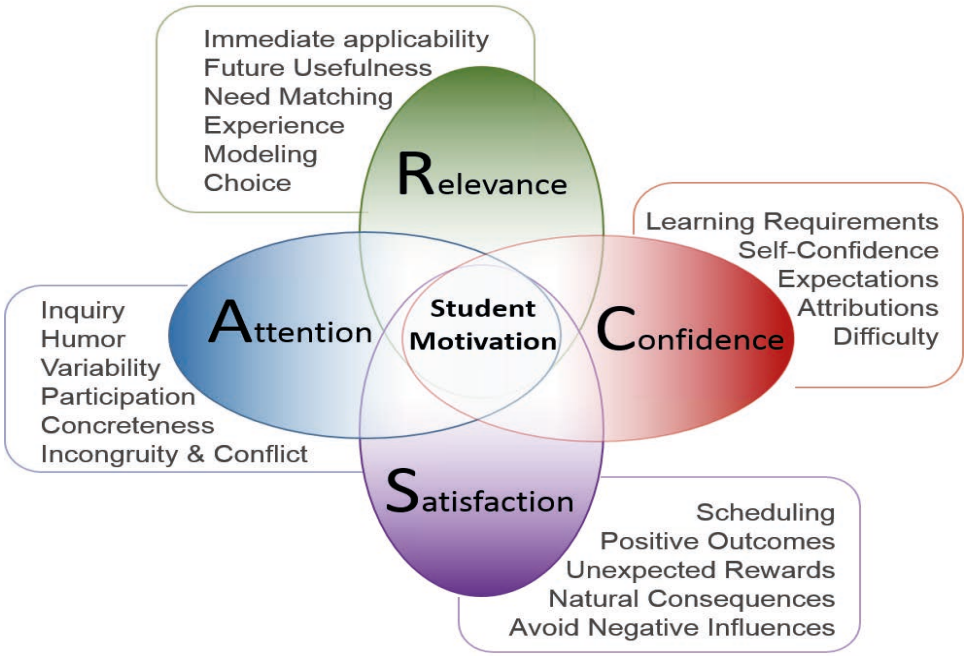


Figure 3-4 Keller's ARCS Model

3.4 Motivation and Technical Requirements

In spite of the increasing interest in motivation research, conclusive results are insufficient, especially in the relatively new field of online learning. Further research studies are required to validate existing motivation theories and models in an online environment. Usability has been identified as a vital factor in certain discussions of online learning motivation. Therefore, the next subsections will discuss the concept of usability and their challenges. Additionally, the importance of usability with various aspects such as motivation, children, culture and language, will be discussed.

3.4.1 Overview of Usability in e-learning

Usability is defined by the international standard as the extent that a product is able to be utilised by particular users in order to achieve their aims effectively, efficiently, and satisfactorily in the relevant use for that specific context (ISO 9241-11, 1998) (see Table 3-5). Usability normally relates to a product's characteristics, as well as technique, approach and process that help to develop usable products. It was in the 1970s when usability was introduced into the software industry, which has delivered benefits that have raised the levels of productivity, sales and revenue, together with customer satisfaction while, decreasing development time and cost, training time, and maintenance expenditure (Nielsen, 1993).

Table 3-5 ISO Definition of Usability

Usability the extent that a product is able to be utilised by particular users in order to achieve their aims effectively, efficiently, and satisfactorily in the relevant use for that specific context.	
Effectiveness	shows the levels of accuracy and completeness that users are able to achieve specified aims. The main components of effectiveness comprise quality/correctness of solutions and error rates.
Efficiency	resources expended regarding levels of accuracy and completeness that users achieve their aims. The main components of efficiency comprise task learning time and task accomplishment time.
Satisfaction	This shows positive attitudes towards the use of the product and freedom from discomfort. The satisfaction factor focuses on how comfortable the user is with the system and how satisfied he/she is with its different features.

Usability has started to gain increasing attention in contemporary e-learning design following the arrival of distance learning, together with the Internet being used with educational development (Neal & Miller, 2005; Somers, 2005). Specifically, within various newly published e-learning design applications, usability evaluation has been brought into the process of design and development (Bach & Lai, 2006; Cousineau, Franko, Ciccazzo, Goldstein, & Rosenthal, 2006; Meyen, Aust, Bui, Ramp, & Smith, 2002; Nahm, n.d.; Storey, Phillips, Maczewski, & Wang, 2002; Tao, Guo, & Lu, 2006). Furthermore, a variety of e-learning design guides and books have evaluated and detailed how usability is important in the process of testing/evaluation process(Boling & Frick, 1997; A. Dillon & Zhu, 1997; Feldstein & Neal, 2006; Zaharias, 2004).

Various commonly-used usability approaches were introduced by Notess (2001), who evaluated use and applicability in relation to online systems of learning, which include testing usability, heuristic evaluations, guidelines of design, cognitive structure and participatory design. Additionally, the utilisation of holistic, rapid-paper prototyping for Web design was presented prior to this by Boling and Frick (1997), and how online courses suggested the necessary testing of usability. In particular, Feldstein and Neal (2006) documented personas and heuristic evaluations (usability tools) that are easily applied to design self-paced e-learning courses, whilst also showing how usability engineering augments the possibility of learners achieving their learning goal or completing the course.

3.4.2 Challenges of Usability Evaluation in the e-learning Context

Certain issues have been shown regarding usability evaluations not fitting the e-learning context, and in particular that online learning systems include learning tasks that are different from user tasks' routine software. Current usability practices possibly fail to reflect all users' learning experiences, which are still restricted to the measurements based on software use. Hence, it is difficult to address certain issues relating to instructional designers, which include learners' motivation and learning outcomes. The need of usability has been documented to require software aspect focus, in order to develop the willingness of users who are capable of application interaction, whilst instructional designers need to be responsible for learning performance (Dillon & Zhu, 1997). Unfortunately, such an allocation is difficult to achieve in practice, even though it provides a plausible approach to cooperation and fair allocation of workload.

Within an online educational environment, interactions generally occur through the computer interface, which is the single medium of connection. Nonetheless, it is not easy to differentiate between the interaction with the learning content and the interaction with the software. Both interactions' effects are integrated, and thus, it is impossible to evaluate each aspect individually. Moreover, a normal person who faces an online learning system is unable to think of him/herself

in the dual roles of “software user” and “learner” when he/she is in their own user’s or learner’s perspective. Online learners are generally unable to behave separately in accordance to the treatment of software or instructions, as they respond to the entire system. Furthermore, user satisfaction is an important goal of usability, which cannot be individualised from the whole experience of learning.

There are various researchers who have suggested that pedagogical and instructional design guidelines need to be integrated into usability study, in order to be effectively applied to the context of e-learning (Nam & Smith-Jackson, 2007; Notess, 2001; Squires & Preece, 1996; Zaharias, 2004). Certain researchers have proposed new heuristics, guidelines or principles that equate more to learning contexts (Squires & Preece 1996, Mehlenbacher 2002, Reeves et al. 2002, Evans & Sabry 2003, Vrasidas 2004, Ardito et al. 2006). Meanwhile, to improve evaluation, others have designed rating tools or checklists (Lohr & Eikleberry, 2001; Sonwalkar, 2002). Some have suggested focusing on learners’ cognitive goals and not merely on simple tasks in the implementation of usability tests (Feldstein, 2002; Notess, 2001).

Numerous different opinions, however, fail to improve the situation and process for e-learning designers. Specifically, after discussing instructional interface design challenges, Lohr (2000) concluded that the issue is not that designers fail to gain access to design principles, it is that there are an excess of principles, which are hard to apply. It is difficult to effectively evaluate online learning systems, due to usability’s loosely bound and multi-dimensional nature; the amount of existing definitions and interpretations (ISO/IEC 25062, 2006; ISO 13407, 1999; ISO 9241-11, 1998; Nielsen, 1993; Ryu, 2005); and the failure to correlate the current practice to measure usability (Hornbæk, 2006). Hence, there is minimal evidence available to demonstrate that it has been achieved, while the potential of usability testing in answering instructional questions has been evaluated. Traditional concepts of usability in software utilisation or Web page navigation are commonly the restriction of current usability practices; thus, in the context of online learning environments, it is beneficial to achieve a holistic and standardised approach to usability. Further research is required to be conducted in order to explain such issues, however, prior to its achievement, due to the fact that learning is affected by interface designs, while there is a correlation between these measurements and the learning outcome or other pedagogically meaningful concepts, which include learner motivation.

3.4.3 Effects of Interface Design upon Learning

Three forms of interaction in a distance education course were identified by Moore (1989): learner-content, learner-instructor and learner-learner interaction. Additionally, learner-interface interaction was also subsequently identified as the fourth of interaction by Hillman et al. (1994)

(see Table 3-6), who stipulate that it is a process of manipulating tools in order to accomplish learning tasks. Such tools often include the computer interface, program instructions, help menus, the Web page interface, and computer peripherals within an online self-paced learning environment. The Web interface and the relevant instructions hold the most relevance within the current study, together with the help menus that are presented on the Web pages.

Quality learner-interface interaction enables learners to focus on the learning process and communication, instead of how it is possible to access instructional content and communicate with others (Lohr, 2000). Learner-interface interaction is a prerequisite for connection from learners in order to access the other three types of interactions, such as to communicate with instructors, peers, and the course content (Miltiadou & Savenye, 2003). If learner-interface interaction was removed, the different three types of interaction would be unable to occur. The learner-interface interaction becomes even more crucial, as it functions as the only medium for learners to access or learn the course content in a self-paced online learning environment, where learner-instructor and learner-learner interactions are not commonly available.

Table 3-6 Four Types of Interactions

Types of interactions	Definition
Leaner-Content Interaction	The intellectual interaction that occurs between learners and the studied topic (Moore, 1989)
Learner-Instructor Interaction	The process that occurs between learners and instructors or teams of subject and experts who prepare the material for the course (Moore, 1989)
Learner-Learner Interaction	Happens among online environment learners, and this occurs with or without the real-time presence of instructors (Moore, 1989)
Leaner-Interface Interaction	A process to manipulate tools in order to complete tasks (Hillman et al.1994, p. 34)

It is possible to infer that usability plays a role in learner-interface interaction quality within online learning environments, due to the fact that usability represents interactive systems' practice. Hence, usability upon learning has been evaluated by various scholars (Ardito et al., 2006; Lohr & Eikleberry, 2001; Squires & Preece, 1996; Storey et al., 2002; Xie, Debacker, & Ferguson, 2006). However, these sources have not presented any sufficient direct evidence to suggest usability or interface design effects upon learning performance. Moreover, different interface designs can potentially influence learning behaviour, while poor quality usability may prove to be negative upon learning for students. Quality usability may affect participation, although this does not automatically result in an improved learning process.

3.4.4 Usability and Motivation

Usability has been identified as a vital factor in certain discussions of online learning motivation. Specifically, within Web-based instruction and Web features, Song (2000) summarised seven categories of research issues of motivation. Xie et al. (2006) demonstrated the system's usability was also an important factor that could affect participation, as well as intrinsic motivation. Meanwhile, Stoney and Wild (1998) noted that user interface to instructional multimedia is strategic, and when it is poorly designed, students are unable to become intrinsically motivated in order to make use of the product or to learn from it. Stoney and Wild (1998, p.40) show that interfaces motivate learners when they are easy-to-use, challenging, engaging, and realistic.

Comparatively, motivation has been incorporated into certain usability studies by usability researchers. Shilwant and Haggarty (2005) discussed usability testing for e-learning, which showed that usability can be equated as: usable, learnable, useful, and motivating. Also, it was determined that participants' confidence increases for user interfaces, which includes an image-map feature with a context path that was found among five types of Web pages (Rumpradit, 1999). Furthermore, a usability questionnaire for e-learning was developed by Zaharias (2006), which included motivation to measure usability levels; the study extended conventional Web-usability criteria and integrated them with criteria that stemmed from instructional designs. This new form of usability evaluation questionnaire included intrinsic motivation as a new form of usability measurement. Two pilot studies within corporate training settings included the tested questionnaire with sample sizes 63 male and 50 female (113) and 110 male and 146 female (256), respectively. There was good internal consistency (α=0.93) with the final questionnaire (version 3), which contained a total of 49 items; specifically, there were 39 that measured the parameters of e-learning usability, and 10 that focused on motivation to learn.

There are certain negative points and limitations that can be identified in the study by Zaharias (2006), even following its seminal effort. Firstly, the research failed to address its validity and merely discussed the reliability levels of the proposed questionnaire, which was not compared to different usability questionnaires. Additionally, the scale of motivation failed to be cross-validated with different motivation questionnaires (e.g. MSLQ or IMMS). Furthermore, motivation as a new usability measure failed to be adequately supported. Indeed, the motivation items were treated separately from the usability items in the questionnaire development process; while, the factor analysis did not include the items of motivation in any of the three rounds of data analysis. There was no presented evidence to demonstrate that the proposed motivation items would be able to form an additional factor within the questionnaire. In addition, following the factor analysis, it is

unclear whether the proposed motivation measurement correlated with the remaining part of the usability factors

The effort shown by Zaharias (2006), in the process of connecting motivation with usability shows the attempt to discover innovative definitions or interpretations of traditional measures of usability within new e-learning contexts. This can also relate to other contexts; for example, Ryu (2005) developed a new Mobile Phone Usability Questionnaire (MPUQ) that was directed at measuring electronic mobile device usability, which incorporates new criteria that includes the performance of particular tasks. Hornbæk (2006) showed that usability measures of effectiveness, efficiency and satisfaction may be insufficient for new contexts of use, which include technology supported learning. In a different study, Lohr (2000) provided a comparison of usability and formative evaluation, which suggests that within an instructional environment, there needs to be an interpretation of instructional function within the measurement of effectiveness and efficiency. A user study that involved e-students was also detailed by Ardito et al. (2006), which proposed a framework of usability evaluation for e-learning systems, which would address four general dimensions of e-learning usability: presentation; hyper-mediality; application proactivity; and user's activity. Additionally, these dimension had working interpretations of effectiveness and efficiency presented for each. Each dimension is defined as follows:

- **Presentation:** the way the lecturer decides to make visualized both lessons and supports (scaffolding) to the students;
- **hyper-mediality** a characteristic of on-line education (hypertextual and/or hypermedial links)
- **application proactivity**: examines the ability to guide user activities and the use of learning tools.
- **user's activity**: analyzes activities which the student could need to perform.

To introduce motivation as a new usability measure, however, remains premature, as interface design effects upon learning remains unclear. It has been shown that experimental results in reference to the effects of usability upon learning performance are limited and can result in contrasting answers. Indeed, there is no experimental study that has revealed the connection between motivation and usability, or towards measurements.

3.4.5 Usability and Children

Motivation factors are different for younger and older people, especially if embedded within the technology. This is because different age cohorts have different levels of understanding and acceptance (Punch, 2002). Despite the availability of guidelines and principles to design e-learning systems, the designers of children's technology encounter challenges. The reason is that the existing guidelines and principles are formulated based on the needs of adults, and not on the needs of the children. However, many researchers have paid more attention to the specifics of

how to design technology for children (Alfadhli & Alsumait, 2015; Alsumait & Al-Osaimi, 2010b; Chiasson & Gutwin, 2005a).

There many guidelines and recommendations presented to meet the language, cognitive, physical, and social needs of children. Chiasson and Gutwin (2005) reviewed the design values arising from research in HCI, psychology and education and which can be modified to meet the requirements of older and younger children. Then, they categorised the principles based on child development into three main areas, cognitive, physical and social/emotional. The cognitive principles include literacy, feedback, mental development and imagination, while physical development consists of motor skills and tangibility. The social and emotional category presents the motivation, social interaction and collaboration principles.

However, those principles could be represented as just a first step, which could be improved and refined in different ways. Chiasson and Gutwin (2005) defined some limitations in those principles and suggested different ways to improve them. Firstly, some design principles are age-specific, which needs more work to be tested in different age groups. Secondly, the majority of research has been on children's physical and cognitive development, which means more research is needed in children's social and emotional developments to design appropriate user interfaces for children. Thirdly, sets of principles are applied for the current technologies existing in that period, not for a new technology. Finally, there is a need for more research to devise the design and evaluation methodology, which integrates those principles.

Other researchers have expanded the traditional heuristic evaluation that was formulated by Nielsen to deal with children's requirements. Alsumait and Al-Osaimi (2010) developed a set of principles for child e-learning applications. Those principles include five principles related to child usability heuristics, which are screen layouts, hardware devices, child challenge, child imagination, and curiosity. However, these guidelines and principles have taken into account mental and physical abilities without the child's social/ emotional development. Alfadhli and Alsumait (2015) investigated and added more principles by considering social aspects for the children. The guidelines have become more concentrated on children's mental and social development to identify the problems in early phase. The guidelines include child learning content, children's motivation, immediate feedback and social interaction. Table 3-7 summarises all the guidelines and principles that have been mentioned above by different researchers.

3.4.6 Usability and Culture

Various factors are evident which potentially influence a user's levels of: satisfaction, behaviour and requirements; Lindahl and Granath (2006) note that these factors are generally connected to

background, education level, culture evaluation and the context of time. Moreover, cultural differences influence the manner that people perceive websites' usability, with 'culturability' referring to connection between culture and usability (Badre and Barber ,1998). Furthermore, Evers and Day (1997) demonstrate how culture impacts upon the user interfaces' perception and acceptance. Meanwhile, culture is assumed to not affect usability evaluations, as most research into usability evaluation methods shows (Clemmensen et al. ,2009).

Table 3-7 Summary of guidelines of child usability

References	Guidelines and principles	Explanation
(Chiasson & Gutwin, 2005a)	Literacy	The interface (text-visual) should be appropriate to different literacy levels
	Feedback and Guidance	The interface provides meaningful feedback and different levels of task guidance
	Mental Development	The interfaces must support different stages of mental development
	Imagination	The interface should use an appropriate metaphor to immerse the children and lead to more intuitive interactions
	Motor Skills	The types of input techniques that can be used
	Tangibility	The use of tangible interfaces
	Motivation and Engagement	The technology needs to keep children's attention and interest
	Social Interaction	How technology encourages the social interaction which takes into account children's beliefs
	Collaboration	How children's technology encourages sharing experiences between children, accommodate with different interaction style and different gender style
(Alsumait & Al-Osaimi, 2010b)	Design Attractive Screen Layout	The screen layout is simple, consistent and efficient
	Use Appropriate Hardware Devices	Input/output devices must be appropriate for age group
	Challenge the Child	The technology uses techniques and methods to challenge the child
	Evoke Child Mental Imagery	The technology encourages child imagination and recognition such as using characters
	Support Child Curiosity	Supports child's cognitive curiosity when dealing with topics
(Alfadhli & Alsumait, 2015)	Child Learning Content	Design learning content suitable for child
	Children's Motivation	Design enjoyable and interesting system
	Immediate Feedback	The system provides immediate feedback
	Social Interaction	The system uses the social media characteristics with the child

At present, various researchers have examined how cultural issues impact upon the usability of websites, as shown by Daniel et al. (2011). The usability of websites is increased by the design of websites showing respect for culture. It has to be understood that appropriateness, acceptance or confusion changes between cultures. Moreover, icons, symbols and pictures provide examples of alterations that exist between users' perceptions from different cultures to specific features of

designs, such as what may be rejected or favoured. A study concluded that culture is vital in achieving effective websites and it is imperative for designers to be cautious regarding users' cultural and usability needs (Daniel et al. ,2011). What is more, Daniel et al. state that culture impacts upon how users perceive different websites.

Culture was shown by Wallace and Yu (2009) to be linked to various factors of usability factors, as well as to the perceptions of usability, as they compared subjects of both North American and Taiwanese origin. The authors evaluated usability through objective analysis of the completion time and the amount of errors, and through subjective analysis of users' ratings in a questionnaire, which produced findings that show how culture correlates to the perceptions of effectiveness and connects to different usability perceptions. Wallace and Yu (2009) came to the conclusion that different cultural groups present varied usability perceptions, and thus, alternate requirements. Therefore, researchers need to create guides to demonstrate how culture is effectual upon multilingual websites' usability. . One of the cultural factors is language, which is discussed in next section.

3.4.7 Usability and Language

Approximately three quarters of all Internet users in 2011 had native language different from English. Additionally, due to cultural factors and differences that need to be taken into account with design, 80% of all European websites offer languages aside from English, despite the associated costs with this process (Smith, 2001; Medhi et al., 2011). Accordingly, various issues are relevant through websites that attempt to address people's requirements whose first language is different to that used in the website, which include poor usability. Subsequently, a potential solution to this could be to translate the website into different languages, and then return the translation back into the original. Indeed, it is often challenging to guarantee usability and quality when a website's designer utilises a different language that is not his/her own. Hillier (2002) has shown there is a direct correlation between website usability and the context culture when using the local language.

The stimulation and desire of a customer correlates to a website's usability, as well as in relation to the language level which is utilised when a website design takes place. A website's translation process is undertaken in order to adhere to others' cultures that potentially require alterations to the complete design, as the website's acceptance relies upon the users' culturally-based requirements (Nantel & Glaser, 2008). Specifically, users can be impacted by the particular culture, language and religion when attempting to construct an impression in regards to a website. Nantel and Glaser (2008) surmise that no studies are evident that have investigated the connection between website usability and designers' cultural and linguistic backgrounds.

Meanwhile, in regards to Western and Eastern cultures, Hillier (2002) explored the correlation and differences between cultural context language and website usability.

Different websites utilise a variety of different components, which include: symbols and pictures; navigation tools; language; written language's direction; sounds and shapes; help features and icons; which are affected by culture and language, and thus, are used to construct a website. Hence, as Badre and Barber, (1998) and Hillier (2002 state, it is essential that these components receive the correct level of consideration. Furthermore, contents, culture and context translations influence people's perceptions and reactions to websites (Hillier, 2002).

3.5 Summary

This chapter has evaluated motivational theories and studies that can motivate children through the four perspectives of psychology, culture, education and technology. In relation to psychological perspectives, many theories have connected motivation with the internal state of learners. Separately, behavioural theories consider motivation as the reinforcement to increase or sustain learners' responses [operant conditioning theory]. Meanwhile, cognitive theories [self-determination theory, self-value theory, self-system theory, goals theory] define the presumption of learners' thoughts, beliefs and emotions that influence motivation.

As the majority of available online storytelling tools do not support the Arabic language, investigation into Arab culture was required. Therefore, the attitudes, beliefs and practices of Arab culture are explored in order to enhance children' motivation. Accordingly, the Hofstede dimensions [Power Distance, Individualism, Masculinity, Uncertainty Avoidance, Long-term orientation] were utilised to clarify the cultural differences within Arab culture. Consequently, the results found that power distance and uncertainty avoidance are high, whilst individualism is low for Arab people. Moreover, due to the similarities between Arab countries regarding traditional, cultural, linguistic and religious factors, the current study has focused on Saudi Arabian culture specifically; a comparison between Saudi and British culture by using Hofstede's Dimensions was achieved. Based on the Hofstede study, the Saudi culture is shown to be a collectivism culture, which means that parents and families are at the centre of society and concern. In accordance, the effects of parental culture through socioeconomic status, home environment parenting style and interaction upon children's motivation levels has been evaluated. Furthermore, characteristics of the Arabic language that relate to Arab culture, as well as the differences between it and the English language are presented, in order for no language to be studied in separation from the culture in which it is spoken.

In addition, educational researches have been discussed in order to understand what motivates children to complete different tasks. In particular, how children are socialised to complete them by obtaining help from teachers and peers. Indeed, there are studies related to the characteristics of classroom and school culture (e.g., activity design, goal orientation, type of task) in obtaining assistance. The two basic theories named are sociocultural theory and self-system theory, which are integrally linked to social experiences that support children's motivation levels. Meanwhile, teachers' roles and peer interaction play important roles in children's motivation; their roles are discussed in the chapter. In regards to the educational context, the ARCS model [Attention, Relevance, Confidence, Satisfaction] by Keller was discussed to try to understand the factors that influence a learner's motivation stimuli to learn. Specifically, this has been applied and tested in different contexts to influence students' motivation levels, such as in traditional learning and face-to-face interaction between teachers and students, computer assisted instruction and distance education.

In regards to technical aspects, the challenges of usability through various aspects such as motivation, children, culture and language have been discussed. Usability has been identified as a vital factor in certain discussions of online learning motivation. However, current usability practices potentially fail to reflect all users' learning experiences, which are still restricted to the measurements based on the utilisation of software. Certain researchers have proposed new heuristics, guidelines or principles that equate more to learning contexts, although there is an excess of principles, which are hard to apply. Different interface designs can potentially influence learning behaviour, while poor quality usability may prove to be negative upon students' learning processes. Also, quality usability may affect participation, although this does not automatically result in an improved learning process, as user interface to instructional multimedia is strategic. When it is poorly designed, students are unable to become intrinsically motivated in order to make use of the product or to learn from it.

However, motivational factors are different between younger and older people, especially if they are embedded within the technology. Therefore, the usability for children has been explored by reviewing the existing guidelines and principles of usability that are formulated based on children's needs. Moreover, respect culture in the design of websites could increase the usability of websites. What is appropriate for one culture may be confusing or unacceptable within another culture. Symbols, icons and pictures provide examples of how there are differences in the perception of users from different cultures to specific design features regarding what is favoured or rejected.

Overall, it was apparent from the literature review that there is no clear framework to motivate children based on their psychological, cultural, educational and technical perspectives. The requirements based on these perspectives must be considered in the process of motivating children in the participation of Arabic online story-writing tools. Therefore, the current study proposes a new framework to identify the requirements that can motivate children through online Arabic story-writing tools. The next chapter develops and proposes the framework to support children's motivation in Arabic web-based story-writing tools.

Chapter 4 Study 1 Developing the Framework of Sustainable, Educational and Technical Requirements (SETr)

Chapter 2 and 3 discussed the research related to digital storytelling, story-writing, and children's motivation from four aspects: psychological, cultural, educational and technical aspects. This chapter examines related requirements for motivating children to participate in web-based Arabic story-writing tools. To date, there is no framework for motivating children in Arabic web-based story-writing tools. Hence, this chapter develops and proposes a framework for supporting children's motivation in Arabic web-based story-writing tools.

4.1 Bridging the Gaps

This research explores children' motivational requirements that could be taken into account to solve the problems and applies it to web-basedArabic story-writing tools. Identifying gaps helps to connect the ideas for this research. The research gaps are;

- The Current elements of digital storytelling focus on the components of the story itself, but do not focus on the components of tools that help to create the story (section 2.2.2). Different elements are applied differently on online and offline storytelling tools (section 2.2.5). Although the literature showed that an online tools can improve student motivation more than offline tools on writing self efficacy (section 2.2.4), no study has been conducted to explore the components that motivate children online in story-writing using tools. Exploring the different requirements for children motivation from different aspects psychological, cultural, educational and technical may help show how online story-writing tools could be designed for Arab children to be more motivated as well as helping teachers to choose an appropriate story-writing tool for their students.
- The process of selecting a meaningful topic and writing the story about the topic is the most important process in digital storytelling. When students pay more attention to the writing process, students will be motivated and engaged in the process of digital storytelling. Based on the literature review (section 3.3.3), ARCS model can solve motivational problem to sustain and stimulate student's motivation. However, this model and their strategies is particularly important for e learning but not for specific tools such as story-writing tools. Therefore, exploring the ways of obtaining children's attention, children's relevance, children's confidence, and children's satisfaction before or after the

process of story writing in online story-writing tools are needed to sustain children's motivation.

- Based on the characteristics of online story-writing tools and author knowledge, no story-writing tools support Arabic language (section 2.2.4). Websites incorporate many important components such as symbols, pictures, navigation tools, language, direction of the written language, sounds, shapes, help features and icons. All of these components are affected by culture and language. Discovering cultural and language requirements could increase children's motivation to participate, in particular when applied in online story-writing tools.
- Due to this research being targeted at 9-12 years old children, motivation factors are different for younger and older people, especially if embedded within the technology. Although there is availability of guidelines and recommendations that meet the language, cognitive, physical, and social needs of children, some design principles are age-specific, which needs more work to be tested in different age groups. Moreover, the usability principles and guidelines applied for the current technologies existing in that period may not be suitable for story-writing tools. Exploring technical requirements for children is required to apply in web-based story-writing tools.

The gaps being addressed here are helped to achieve one of the objective of Saudi vision 2030 which focused on building children's character. The investigation of the requirements that can motivate children to participate on the activities in web-based story-writing tools can build children's character and the fundamental values of initiatives persistence and leadership, as well as social skills, cultural knowledge and self-awareness. Thus, creating a suitable framework may achieve this objective of Saudi vision 2030 and help address the problem. This framework is presented in the next section.

4.2 The Framework Construction

Synthesizing the research is crucial to developing a new framework. The framework is based on problems raised by each of the proposed research areas. For that, the process is divided into three phases, which are illustrated in Figure 4-1.

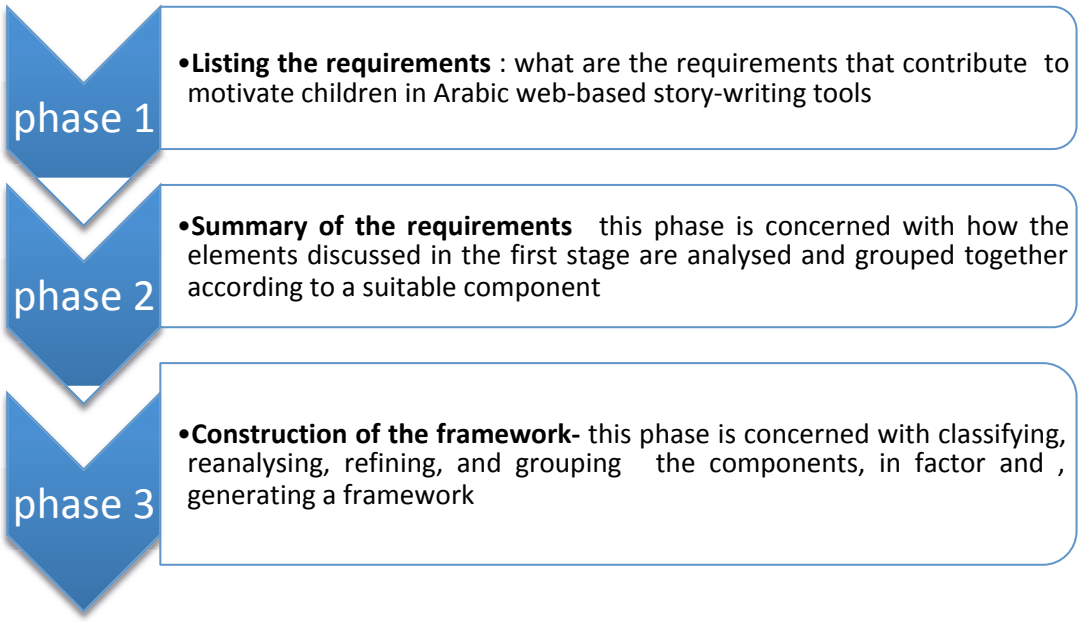


Figure 4-1 Phases in Framework Development

4.2.1 Phase 1: Listing the requirements

In developing the framework, the first phase is to list out all the requirements related to children's motivation. These requirements are analysed and extracted from the discussions in Chapters 2, and 3. The process of analysis questions: what are the requirements to sustain children's motivation before and after the process of writing stories in the online story-writing tools? What are the educational requirements that motivate children and must be taken into account in the online story-writing tools? What are the specific technical requirements (user interface) to motivate children who aged 9-11 years old? What are the technical requirements (user interface) that can motivate children to participate in online story-writing tools with respect to the Arab culture and Arabic language? . Therefore, four issues were analysed.

First, ARCS model is an instructional design approach that assists instructional designers in creating appropriate motivational elements for the intended learners (section 3.3.3). However, the strategies suggested in ARCS Model are general but unsuitable to motivate children in the process of writing stories in online story-writing tools. ARCS model here will be used to design motivational strategies to be suitable for children that can stimulate or sustain learners' motivation to write stories in online story-writing tools. Thus, sustaining the children's motivation to the process of writing will be based on the components of the ARCS Model (Attention, Relevance, Confidence, Satisfaction).

Secondly, the story-writing tools should have educational requirements to motivate children that are linked to social experience. These requirements were discussed in section 3.3.1, section 3.3.2

and section 3.2.3. Based on the previous research, the most important educational requirements to motivate children are: school culture, Teacher's role, peers and parent roles.

Third, ensuring the usability for children is one of the technical requirements in online story-writing tools that must be considered. The effects of usability on children's participation as well as intrinsic motivation, and the features of the usability for children are discussed in (section 3.4.4) (section 3.4.5). The usability for children is required to ensure if the tool easy to use. However, most existing guidelines and principles are formulated based on the needs of adults, and lack of studies expanded the traditional heuristic evaluation that was formulated by Nielsen to deal with children's requirements. So, the usability features aim to check to what extent the user interface for the tool is easy to use by children.

Finally, considering cultural and language requirements when designing the online Arabic story-writing tools are crucial. The relationship between usability and culture as well as the usability and language, are discussed in (section 3.4.6) and (section 3.4.7). Symbols, pictures, navigation tools, language, direction of the written language, sounds, shapes, help features and icons are all considered cultural requirements that must be incorporated in designing the online story-writing tools. However, there are specific characteristics for Arabic language that must be considered in online Arabic story-writing tools (Al-Muhtaseb & Mellish, 2008; Alrowais, Wald & Wills, 2013; Dajani & Omari, 2013; Smith, 2001). Table 4.1 summarises the most important features of Arabic language that must be considered in the online Arabic story-writing tools. Therefore, technical requirements can consist of the usability for children as well as the usability for Arab culture to motivate children in story-writing tools.

4.2.2 Phase 2: Summary of the elements

In phase 2, each element identified in Phase 1 is gathered, refined, and then, grouped into a suitable component. Table 4-2 shows the summary of the refined elements. The research themes were the issues discussed in Phase 1. Based on the themes, the identified requirements were grouped into components. This summary helps to focus on which components are important as the groundwork of the framework.

4.2.3 Phase 3: Construction of the framework

The construction of the framework is founded on previous research findings and established theories relating to children's motivation from psychological, cultural, educational and technical aspects. In this phase, the proposed framework is constructed for identifying the motivational requirements for children in Arabic online story-writing tools. The requirements and components

identified in Phases 1 and 2 were collected, analysed for recurring and similar components, refined and re-analysed, and then summarised into a constructive framework. Following the summary, the research themes were categorised as a factor and the discussed components were grouped and named as components of the framework.

The framework suggests that the motivational requirements for children in online Arabic story-writing tools can be determined by three factors and nine components. Table 4-3 presents the classification of the factors and its related components for inclusion in the proposed framework. The detailed descriptions of these six factors are presented in the next section.

Table 4-1 writing features for Arabic language

Writing skills features		Arabic
Orthography		Transparent (shallow) and non-transparent (deep)
Grammar	Sentence Structure	Has both nominal (two nouns, no verb) and verbal sentences Verb first followed by the subject. V + S + O/C
	Verb to be	No
	Has Past tense form	Yes
	Has Present tense form	Yes
	Has Future tense form	No
	Has Model verbs	No
	Indefinite Articles	No
	Irregularity of conjugation of verbs	Yes
Includes diacritical marks		Yes (14 diacritical marks represent the short vowels)
Gender-specific language (Spoken instructions vary for each gender)		Yes
Direction of writing		Bi-directional (Right to left for text and left to right for numbers)

Table 4-2 Summary of identified requirements for the framework

Research Themes	Motivational requirements	Reference	Psychological	Cultural	Educational	Technical
ARCS Model of Motivation	**Attention**	Skinner (1974)(Keller, 1987a,; 1987b; 2009)(Chiasson & Gutwin, 2005a)	✓		✓	✓
	Relevance	(Keller, 1987a,; 1987b; 2009).	✓		✓	✓
	Confidence	(Keller, 1987a,; 1987b; 2009).(Nelson-Le Gall & Scott-Jones, 1985)(Rumpradit, 1999).	✓		✓	✓
	Satisfaction	(Keller, 1987a,; 1987b; 2009)(ISO 9241-11, 1998)(Hornbaek ,2006)(Lindahl & Granath, 2006).	✓		✓	✓
Educational Requirements focused on socialise and getting help	**School culture**	(Gottfried, 1990)(MacIver et al., 1991)(Harter, 1992)(Skaalvik and Rankin, 1995)(Ames ,1992)(Nelson-Le Gall, 1992)(Webb & Palincsar, 1996).(Eccles and Roeser, 1999).	✓		✓	
	Teacher role	(Vygotsky, 1978)(Skinner & Belmont, 1993)(Skinner, Wellborn, & Connell, 1990) (Meece, Blumenfeld, & Puro, 1989)(Nelson-Le Gall & Glor-Scheib, 1985)(Newman, 1991) (Butler, 1987, 1988) (Maehr & Anderman, 1993) (Newman & Goldin, 1990).	✓		✓	

	Peers role	(Ellis & Gauvain, 1992)(Tomasello, Kruger, & Ratner, 1993)(Tudge & Rogoff, 1989) (Meece, Blumenfeld, & Puro, 1989)(Nelson-Le Gall & Glor-Scheib, 1985)(Newman, 1991) (Connell's ,1990) (Alfadhli and Alsumait ,2015) (Chiasson and Gutwin ,2005)	✓		✓	✓
Research Themes	**Motivational requirements**	**Reference**	**Psychological**	**Cultural**	**Educational**	**Technical**
Technical requirements focused on the user interface features	**Usability for Arabic language and culture**	(Medhi et al., 2011)(Smith et al., 2001) (Hillier, 2003) (Badre, 2000) (Elbeheri et al., 2006) (Al-Wabil et al., 2006) (Elbeheri, 2004). (Al-Muhtaseb & Mellish, 2008)(Mahfoudhi et al., 2011)	✓	✓		✓
	Usability for children	Song (2000), (Xie et al. 2006) (Stoney and Wild ,1998) (Chiasson and Gutwin (2005)	✓		✓	✓

Table 4-3 Classification of the factors and components in the proposed framework

Research Themes (refer to Table)	**Factors in Framework**	**Discussed Components (refer**	**Components in Framework**
ARCS Model of Motivation	Sustainable factor for support the children motivation in the process of writing stories	• Attention • Relevance • Confidence • Satisfaction	• Obtaining children's Attention • Establishing relevant strategies • Gaining Children's confidence • Obtaining Children's satisfaction
Motivation and Educational Requirements focused on socialising and getting help	Educational factor	• Teacher role • School culture • Peers and parent role	• Teacher role • Class management • Social presence
Motivation and Technical requirements focused on the user interface features	Technical factor	• Usability for Arabic language and culture • Usability for children	• Usability for Arab users • Usability for children

4.3 The proposed Framework

The proposed framework is derived from the development phases discussed in section (section 4.2). The Framework for the requirements that motivate children in writing stories whilst using Arabic online tools is based on three suggested factors: sustainable, educational and technical requirements (SETr). The framework is named based on their main factors. Each of the factors is described below;

- **Sustainable factor**

ARCS model is applied in this study to help in identifying the requirements that can engage more learners and sustain learner engagement. Specifically, it will be applied to know the requirements

that can sustain children's motivation before and after the process of writing stories in the tool. Four elements based on the ARCS model will be used to assess or design story-writing tools. There are obtaining children's attention, establishing relevant strategies, Gaining Children's confidence and obtaining children's satisfaction.

- **Educational factor**

This factor defines the educational requirements that are focused on socialising and getting help to motivate children to participate in the tool. Some available tools such as Tikatok and StoryJumper (section 2.2.4) do not have features that support teacher role, class management and social interactions with children within the tool. For that reason and based on previous research in motivation and educational requirements in Chapter 3.3, three components are suggested: teacher role, class management and social interactions. When confirmed the framework, strategies will be suggested by experts reviews that focused on socialising and getting help.

- **Technical factor**

The factor will define the technical requirements, which considered the user interface features to motivate children to participate in the tool. This factor considered the user interface features based on the requirements for Arab culture and children. Two components are suggested based on the previous research: usability for Arabic language and Arab culture, as well as usability for children.

To conclude, Table 4-6 lists all the factors and components suggested for each of the factors in the SETr framework. Based on the table, the factors of framework are specific to the implementation of online Arabic story-writing tools to motivate children to participate. These factors have to be arranged, combined, and built into a single reference framework

Table 4-4 Factors and Components in the SETr Framework

No.	Factors	Components
F1	**Sustainable factor**	• Obtaining children's Attention • Establishing relevant strategies • Gaining Children's confidence • Obtaining Children's satisfaction
F2	**Educational factor**	• Teacher role • Learning management

		• Social interactions
F3	**Technical factor**	• Usability for Arabic language and Arab culture • Usability for children

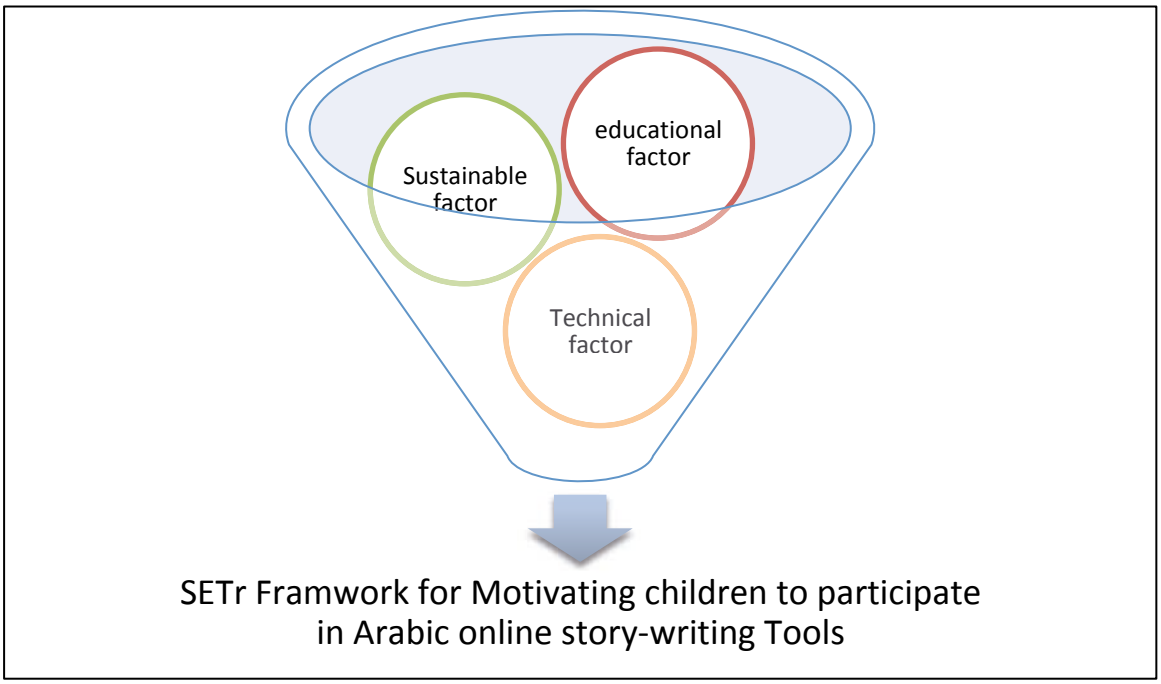


Figure 4-2 overview of the proposed framework

- Obtaining children's Attention
- Establishing relevant strategies
- Gaining Children's confidence
- Obtaining Children's satisfaction

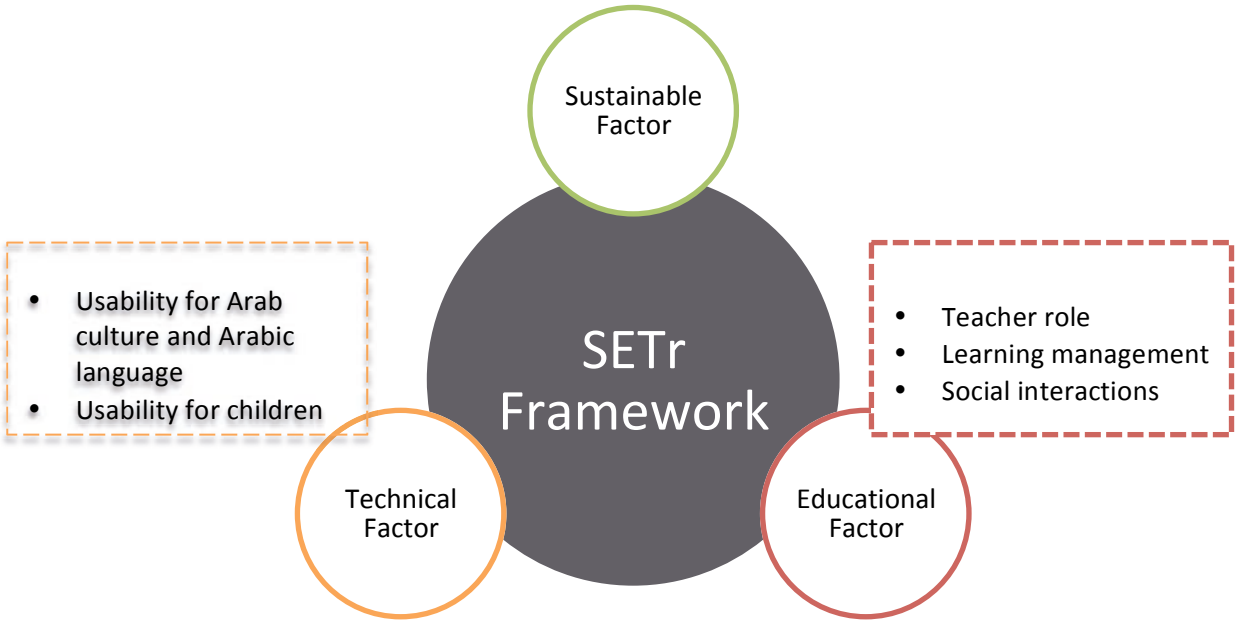


Figure 4-3 the proposed framework

4.4 Chapter Summary

A review and a discussion of children' motivation and their relation with different aspects: physiological, cultural, educational, technical aspects have informed the development of the framework for motivating children to participate in online Arabic story-writing tools. The framework was developed over three phases. The first phase was to list all the requirements related to children motivation. These requirements are analysed and extracted from the discussions in Chapters 2, and 3. The second phase was concerned with how to refine the elements discussed in phase 1, summarising the research issues into themes, and grouping the elements in the research theme according to their suitable component. The third phase was concerned with generating the factors and components for inclusion in the framework. As a result, the framework for the requirements that motivate children to participate in online Arabic story-writing tools, was proposed. The framework was named and shortened based on their factors (**SETr**), which includes the three following factors:

1. **S**ustainable factor
2. **E**ducational factor
3. **T**echnical factor

In the next chapter, the proposed framework therefore needs verification and confirmation. Once the framework has been confirmed, further validation of its use are explored and examined. Next, the research methodology applied to further this research is outlined.

Chapter 5 Study 1 Confirming the Framework of Sustainable, Educational and Technical Requirements (SETr)

This chapter describes and discusses the methods used to confirm the SETr framework. The using of these methods is working in line with the research objectives where the research attempted to define;

1. Study1: ***A suitable framework for identifying the requirements that motivate 9-12 years old children whilst using web-based story-writing tools?***

This chapter also will present the analysis of both the quantitative and qualitative data that resulted from the expert review and survey, and the discussion of the findings. The contents of this chapter are presented in Figure 5-1.

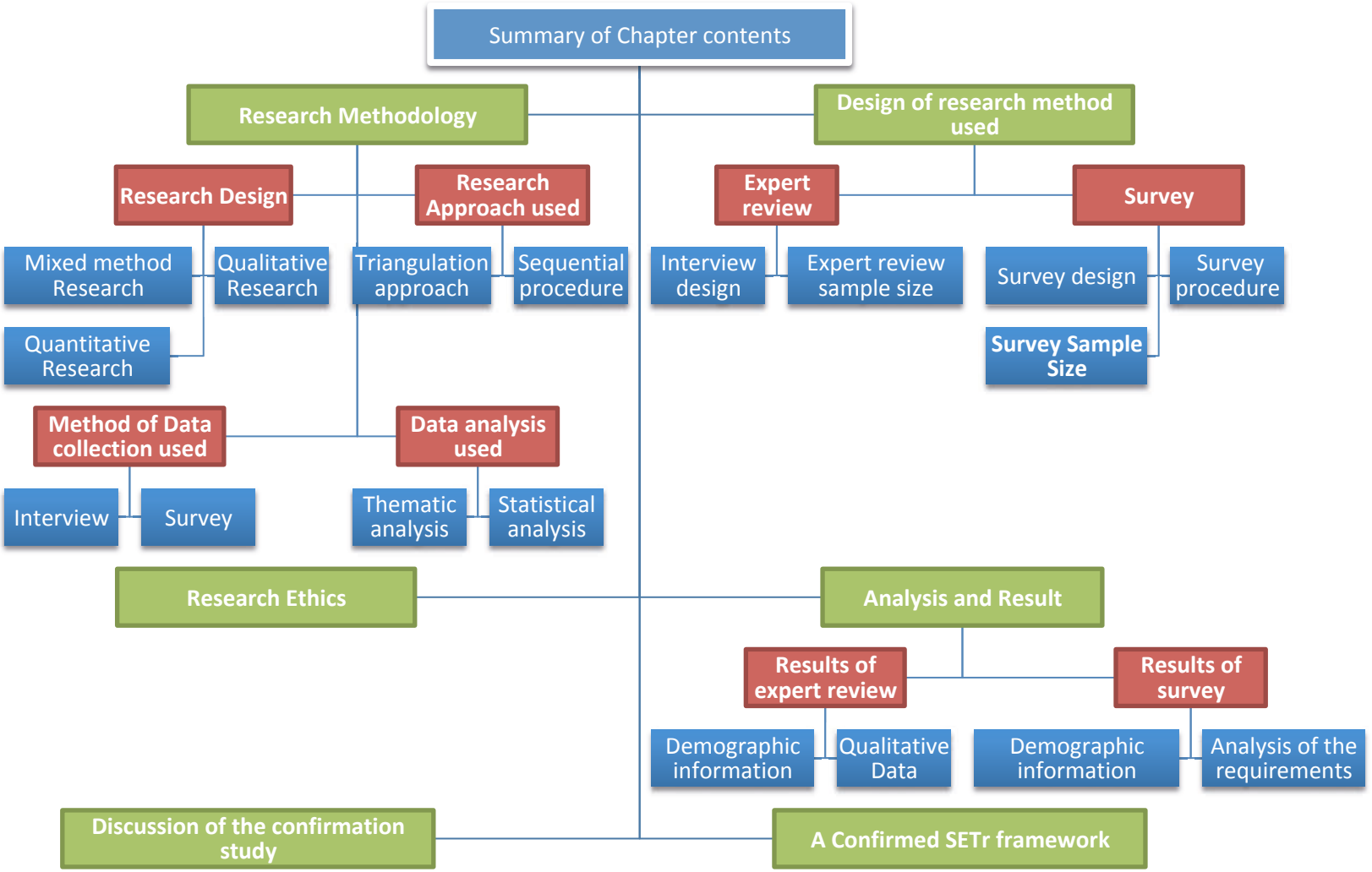


Figure 5-1 Summary of chapter content

5.1 Research Methodology for Confirming SETr Framework

For providing appropriate conclusions, it must apply a suitable research method. Therefore, this section explains the research methods, which have been used, and the logical reason for the chosen method. This section will also provide explanation in the following subsections; research design, research approach, the techniques for data collections, the techniques for data analysis, and ethical consideration.

5.1.1 Research Design

There are three techniques used to collect, analyse and interpret data, which are the qualitative, quantitative and mixed research. All three researches designs are discussed in detail in the following subsections.

i. Qualitative Research

Qualitative research can be more useful for gathering and analysing data that cannot be expressed in numbers to gain more information about human attitudes, current situation, decisions or opinions (Creswell & Clark, 2007). This technique is used to investigate and explore in-depth for a specific phenomenon that is not well researched or yet developed (Recker, 2012). The data from qualitative research will be subjected to the researcher's interpretation. Here, there is the notable possibility of research bias (Creswell, 2007; Sekaran, 2013). The sample size in this method is not predetermined but usually limited and adequate to answer the research question (Marshall, 1996).

ii. Quantitative Research

Quantitative Research is used to collect and interpret data that can be expressed in terms of quantity. This research method is useful in confirmatory research where a previously developed theory needs to be confirmed (Recker, 2013). The research is often designed with structured and close-ended questions, to avoid researcher biases (Creswell, 2009). Quantitative research is adopted for confirming existing information rather than exploring a new idea. Among the strategies involved in quantitative study are the controlled experiment and survey research (Creswell, 2009; Easterbrook, Singer, Storey, & Damian, 2008). A large number of participants are required to represent the population.

iii. Mixed Method Research

Mixed method combines between qualitative and quantitative research, methods, techniques or approaches in one study to minimise the weaknesses of both single methods and increase the strength of the studies (Johnson & Onwuegbuzie, 2004). There are five means by which to conduct mixed methods researches: triangulation, complementary, initiation, development and expansion (Johnson & Onwuegbuzie, 2004).

- Triangulation: confirming the results of the study by using different methods to study the same problem
- Complementary: the findings of the study from one method will be used to clarify, elaborate and illustrate the findings from another method
- Initiation: discovering the contradictions between different methods that will lead to re-formulating the research question.
- Development: using the findings from one method to help in obtaining another method.
- Expansion: different methods will be used to study the different problems to expand the area or group of research.

The reliability of data and findings is an essential requirement in any research process (Cotten, 1999). Different procedures, such as interview and questionnaire, can be used to achieve the reliability of the data. Moreover, different types of data, qualitative and quantitative, will be collected to ensure the consistency and reliability. A mixed method such as triangulation provides cross-checking for internal consistency and reliability within the method as well as the external validity between methods (Jick, 1979).

In this study, a mixed methods approach, specifically triangulation, has been chosen to collect quantitative and qualitative data.

5.1.2 Research Approach used

The research approach section presents how the selected mixed method research design was chosen in order to collect both quantitative and qualitative data, which are shown in detail below.

5.1.2.1 Triangulation approach

The triangulation method utilises at least two methods, which is a mixed method approach to data collection, in order to study social behaviour (Cohen et al., 2013). This better offsets bias and weaknesses in comparison to a single method design (Jick, 1979; Zachariadis, Scott, & Barrett, 2013); hence, improves research validity and outcomes. Triangulation is a presented combination of different theoretical aspects (i.e. proposed framework), and is a practical approach (i.e. the form of data collection to support the chosen framework). Triangulation is best for studies that

are exploratory and confirmatory, will data and theory combined through comparisons, integration and interpretation (Creswell, 2009; Warfield, 2010; Zachariadis et al., 2013). In the next sections, the different triangulation stages are presented, which culminated in the final pattern of understanding being taken. Therefore, triangulation in the research design helps to confirm the proposed framework for the study.

5.1.2.2 Sequential procedure

As Creswell (2009) demonstrates, a mixed method research design includes two forms of procedures that are able to conduct a research study: concurrent and sequential. A concurrent procedure conducts both quantitative and qualitative studies at the same time, while a sequential procedure conducts the quantitative and qualitative study in staged sequence. In the sequential procedure this can either be done through a sequential explanatory form, where the quantitative study is initially conducted; or a sequential exploratory manner, where the qualitative study is conducted initially before the quantitative.

The framework's foundation has to be further explored in order to comprehend its relevance, as the emphasis is designed to confirm the suggested study framework, before empirically expanding upon the research's finding. The sequential exploratory form is most relevant to a study when a researcher aims to develop a specific innovative instrument and if the researcher aims to discover what is potentially available, and to support existing implementation through statistical data (Creswell, 2009). Subsequently, this study has utilised a sequential procedure through an exploratory strategy. Specifically, for the qualitative study, an expert interview was applied (see Section 5.2.1); while for the quantitative study, a questionnaire survey was applied (see Section 5.2.2). For the procedure of mixed methods, see Figure 5-2.

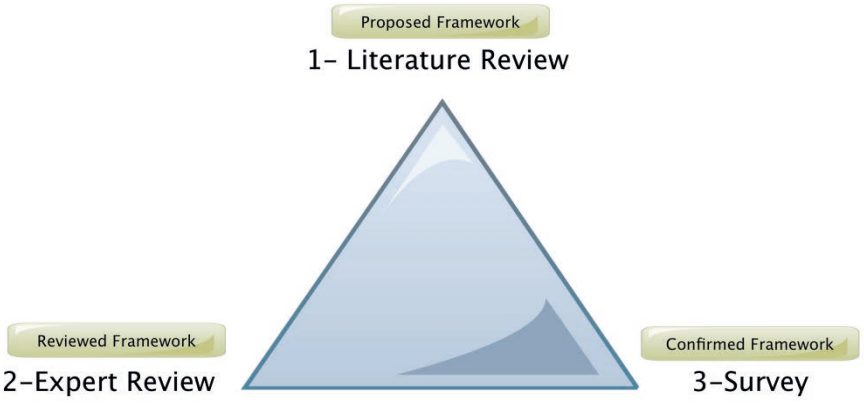


Figure 5-2 Triangulation Research Methodology

5.1.3 Method of data collection used

A research method provides a certain direction as a strategy in order to guide the processes of a particular research design (Creswell, 2009). The research methods that have been applied in the current study describe in the following sections, which were all used based on the set research design and its suitability to address the investigative questions.

5.1.3.1 Interview

There are four main types of qualitative methods to collect data: interviews, observation, documents and audio visual materials (Creswell, 2013). Interview is one of the most common data collection methods used among researchers (Sekaran, 2006). The interview can be conducted face- to face, via telephone or online, such as through video conferencing, and is categorised as either unstructured, structured, semi-structured or group interview. The first three interview methods involve conversation and a predetermined set of questions while the last method requires the interviewer to guide the group in discussion in a specific situation (Sharp, Rogers, & Preece, 2007). The appropriate interview approach is determined based on the evaluation goals, the questions to be identified and the model adopted (Sharp et al., 2007). Each of the interviews approach has benefits, as follows (Sharp et al., 2007):

- Unstructured or open-ended interview: this kind of interview allows the interviewee to produce rich data which the interviewer may not yet have explored.
- Structured interviews: consist of closed-ended questions and precise answers for easy data analysis. It is useful when the research goal is clear and the specific closed-ended questions can be addressed.
- Semi-structured interviews: uses both structured and unstructured features.
- Focus group: normally involves from three to 10 people to allow the raising of sensitive issues which have not yet been identified.

All details for conducting interviews are explained in section 5.21.

5.1.3.2 Survey

Survey is one of the most popular techniques used to gather quantitative data (Bhattacherjee, 2012). It consists of sets of questions that may be unstructured or structured. Unstructured questionnaires require the respondent to write the answer while the structured format gives the respondent a set of choices (Bhattacherjee, 2012). Structured questionnaires can take the form of multiple scales or indices focused on the same construct (Jick, 1979).

In order to measure the participant's attitudes toward a specific phenomenon, a Likert Scale is utilised, which helped to ascertain the responses from participants in relation to their own opinions, beliefs, and attitudes regarding the detailed items (DeVellis, 2017). There is no specific theory shown that has been presented to select the correct or most beneficial scale length.

All of the details for conducting these surveys are explained in section 5.2 for confirmation of the framework.

5.1.4 Data Analysis used

The method for analysing the data obtained followed the research approach chosen in this research. For the qualitative design, thematic analysis was chosen to analyse the interview data and for the quantitative design, this research used the statistical analysis including the t-test.

5.1.4.1 Thematic Analysis for Qualitative Data

There are many techniques by which to interpret and analyse qualitative data. Coding is the most popular technique used to analyse and reduce a large amount of collected in qualitative research (Recker, 2012). The coding process starts by assigning labels to chunks of the data, such as words, phrases, paragraphs or entire documents (Recker, 2012). Through coding, the data can be organised and categorised around a key idea or concept. Thematic analysis is one of the techniques used to analyse interview data. The technique helps explore the interview data based on the selected 'theme', from the research question (Silver & Lewins, 2014). The thematic process, which is the development of themes to analyse the data can be conducted in two ways, the deductive approach or the inductive approach (Braun & Clarke, 2006; Silver & Lewins, 2014). Theme development using a deductive approach is based on the theoretical aspect and is determined prior to the analysis process. Whereas, in the inductive approach, the themes are developed based on the content of a dataset and are structured while reading and interpreting the dataset. When both approaches are applied together, it is called abductive approach (Silver & Lewins, 2014). A method to analyse the interview data followed the chosen research design, which is the exploratory descriptive design. These processes are subject to how the data is interpreted by the interviewer. There is valuable software, such as Nvivo, to assist in the analysis of large volumes of qualitative data (Recker, 2012).

5.1.4.2 Statistical Analysis for Quantitative Data

There are two techniques to analyse quantitative data: descriptive and inferential analysis (Bhattacherjee, 2012). The former refers to statistics that describe, combine and present the components of interest or the relationship between components. The latter refers to the statistics

testing the hypothesis. SPSS and SAS are the most popular software to analyse quantitative data (Bhattacherjee, 2012).

Various methods of analysis were employed in order to analyse the data, which included: descriptive; frequencies; t-test; and reliability. To explore the data, the t-test helps to comprehend the interrelationships among the tested set's variables (Hair, Anderson, Tatham, & Black, 2009). The frequencies and descriptive analysis methods were utilised to view the respondents' distributions and different variables (Hair et al., 2009). The reliability test was undertaken to determine whether the measurement items reflected the measured construct consistently (Field, 2014); in order to measure the internal consistency of a scale, Cronbach's alpha will be calculated and presented (Hair et al., 2009).

5.2 Design of Research Method used for Study 1

This study uses a mixed method approach to confirm suggested factors and their requirements in the current framework and explore potential factors that can motivate children in Arabic web-based story-writing tools. The framework was created based on the literature review, which is considered the first stage of theoretical triangulation. Methodological triangulation has used two methods: interview and questionnaire. The expert review design and survey design are discussed in following sections.

5.2.1 Expert Review

Qualitative interview has been conducted to collect various opinions, values and knowledge from individuals or group of experts to obtain information about a specific issue. Semi-structured interview will be used to gather individual attitudes and discover their in-depth experience (Bolderston, 2012). It is used to collect data based on their experience regarding the requirements for motivating children whilst writing Arabic story in online tools. Based on suggested factors: sustainable, educational and technical, the questions are designed

5.2.1.1 Interview Design

The semi-structured interview involves open and closed-ended questions about the framework. The objective of the interview is to review the factors and component from the proposed framework (add, delete and modify factors). The interview questions have been designed in the English language and translated into Arabic. Furthermore, four Arab researchers from the University of Southampton have piloted the questions to ensure the accuracy of the questions

and translation. A copy of the interview questions in English language is shown in in Table 5-1. A copy of the initial interview questions in English and Arabic versions found in Appendix A.

Table 5-1 Interview Questions

Dimensions	Numbers	Questions
Sustainability requirements	Q1	Do you think obtaining a child's attention is an important component that can motivate children whilst writing story in tools? Why? How?
	Q2	Do you think establishing strategies that related to child interest is an important component to motivate child whilst writing story in tools? Why? How?
	Q3	Do you think applying strategies that Gaining Children's confidence is an important component to motivate child whilst writing story in tools?? Why? How?
	Q4	Do you think applying strategies that obtaining child satisfaction is important component to motivate child whilst writing story in tools? Why? How?
Educational requirements	Q5	Do you think teacher role is an important component to motivate child whilst writing story in tools? Why? How?
	Q6	Do you think Learning management is an important component to motivate child whilst writing story in tools? Why? How?
	Q7	Do you think social presence (such as parent and friends) is an important component to motivate child whilst writing story in online tools? Why? How?
Technical requirements	Q8	Do you think the usability for Arabic language and Arab culture is an important component to motivate child whilst writing story in online tools? Why? How?
	Q9	Do you think the usability for children is an important component to motivate child whilst writing story in online tools? Why? How?
General questions	Q16	Are there any factors or components missing?
	Q17	Would you change any of these components?
	Q18	Can you tell me more about components that can motivate children in Arabic online story-writing tools?

5.2.1.2 Expert Review Sample Size

The interviews were done with 13 experts - developers, academics and Arabic teachers- to ensure that all the proposed factors and components will answer the research question. The sample size of the interview was identified as 13 based on the saturation concept whereby no new knowledge has been achieved after twelve (Guest, Bunce, & Johnson, 2006). The experts have been chosen based on their knowledge of the subject area (Bhattacherjee, 2012). The interview was conducted either face-to-face, or by telephone, according to the experts' preferences (Opdenakker, 2006). Table 5-2 summarises the expert sampling.

Table 5-2 Experts Sampling

Area of experts	Number of experts	The criteria for being chosen
Developers	2	Experience of more than three years Developed Arabic application for children
Academics	4	Experience of more than three years Experience with children from 9-11 years in Saudi Arabia
Teachers of Arabic language in primary school	7	Experience of more than three years Experience with children from 9-11 years in Saudi Arabia

5.2.2 Survey

A survey is the most popular method for quantitative research and was used to confirm the updated framework from the experts review. For this study, a questionnaire has been chosen to measure a wide range of unobservable data by capturing the responses from respondents (Bhattacherjee, 2012). The questionnaire will be conducted via email, online or web survey.

5.2.2.1 Survey Design

This survey was designed by using a self-administered on-line questionnaire to confirm the requirements that were suggested based on both the literature and expert review. High level of care is required to develop, pilot and refine the questionnaire (Cohen et al., 2013). The survey is divided into two parts: demographic information and nine closed-ended questions related to three factors and components.

The first set of questions is designed to gather data about participants' background (educational level, area of experience, years of experience with children) and information related to the child (gender, educational system, schools types, digital stories interest). All questions are asked to confirm their eligibility for this study. The second part is closed-ended questions for nine factors, which are to confirm the proposed requirements. These requirements are obtaining a child's attention, establishing child relevance, gaining Children's confidence, obtaining child satisfaction, teacher role, learning management, social presence, teacher role, usability for Arab culture, and usability for children.

A Likert Scale questionnaire was utilised to measure the closed-ended questions through a 5-point rating (i.e. 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree). This was used in the research as it provided sufficient options, as well as being simple to use for participants (Johns, 2010; DeVellis, 2017). Moreover, it helps to increase rates of response and quality levels (Revilla, Saris, & Krosnick, 2014). An alternative is a 7 or 9-point Likert scale that can provide a greater range of response options; although, these present only a minimal difference to the 5-point rating (Johns, 2010; Revilla et al., 2014). Consequently, the small alternative choices between the options can result in confusion. Comparatively, the participants become obliged to select either agreement or disagreement to statements, and what is important or not through a 4- or 6-point Likert scale. Indeed, this helps to remove uncertainty in the responses by participants (Revilla et al., 2014).

The questionnaire is translated to Arabic to be clear and understandable for all participants. Therefore, the survey was reviewed by asking three Arabic researchers to ensure the accuracy of the translation. Smart Survey was used to generate the online survey. The questionnaire was piloted to increase the reliability, validity and practicability (Cohen et al., 2013). It was tested by asking three of experts and three parents in Saudi Arabia in order to gain feedback about the clarity of the questionnaire.

5.2.2.2 Survey Procedures

The participants were contacted via email. The email message contained the link to the survey and also included a consent form that detailed the purpose of the study and the importance of their participation.

5.2.2.3 Survey Sample Size

The aim of the study is to investigate the requirements that can motivate children in Arabic web-based story-writing tools. Thus, only participants having experience of more than three years with children aged between 9 and 12 years were included in the study. The questionnaire will be sent to the participants (such as parents, teachers, researchers or psychologists] to obtain a high number of respondents and thereby obtaining robust findings. They were chosen because of their assumed experience of working closely with children and knowing what factors could motivate them.

In order to identify the minimum sample size, it is important to calculate an appropriate sample size by using the G*Power tool, which is based on a preselected parameter.

There are two types of errors, type I and type II, which are required to calculate the minimum sample size (Faul, Erdfelder, Lang, & Buchner, 2007). Type I errors (alpha) occur when researchers discard the worthless theory, which means the sample is true in the population. Type II errors (beta) occur when investigators fail to reject the null hypothesis, which means the sample is not true in the population. The conservative variation for alpha is between 0.01 and 0.05, while beta id from 0.05 and 0.20. By convention, alpha is set at 0.05 and beta 0.20 (Banerjee, Chitnis, Jadhav, Bhawalkar, & Chaudhury, 2009). The researcher should select the lowest value of alpha or beta when he wants to avoid error I or error II. The effect size is also required to calculate the sample size to measure the association between the predictors' variables and the outcomes. Cohen (1988) established three effects sizes which he termed d: small (d=.20), medium (d=.50) and large (.80). Large effect size is usually chosen in exploratory studies (Cohen, 1988b). The minimum sample size will be 12 participants based on G*Power software. Figure 5.3 shows the calculation of the total sample size by using G* Power.

A sample for a significance test must be significantly large in size in order to assume that the data is distributed in a normal manner following the central limit theorem (Field, 2014). The form of utilised statistical test changes depends on the size of the sample. To create an approximately normal distribution, a minimum sample size of 30 is assumed to be sufficient (Field, 2014). Additionally, a minimum sample size of 30 will create a significance test with a normal distribution assumption, together with reduced risk of committing Type I and Type II errors within an acceptable effect, which helps to guide participant recruitment when undertaking the present study's quantitative method design.

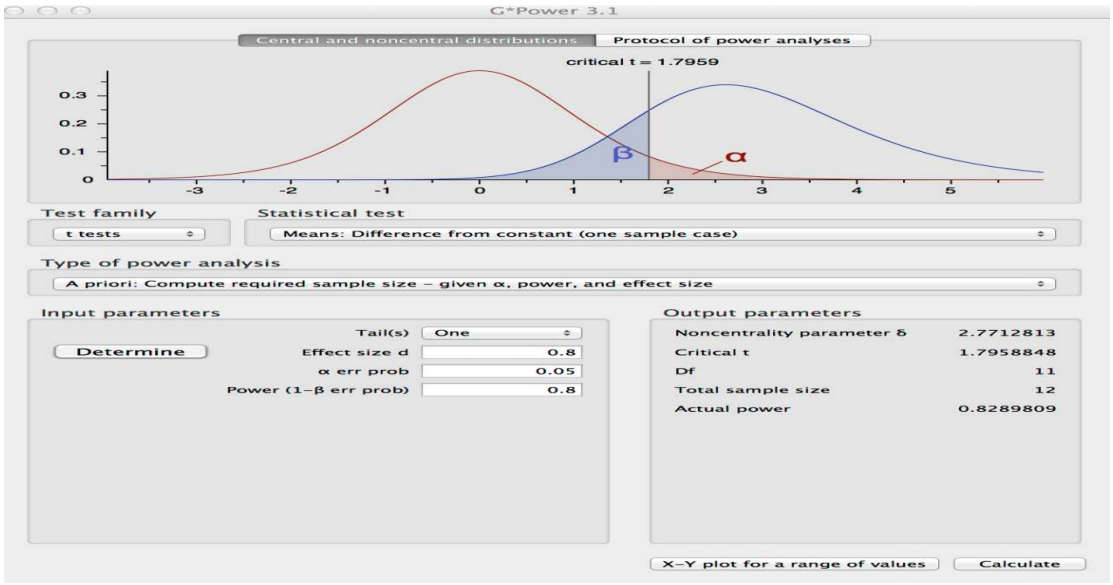


Figure 5-3 The calculation of sample size by using G*Power software

5.3 Research Ethics

Ethical approval was obtained from the University of Southampton ethics committee before conducting the interviews and distributing the survey to the participants. The reference for the research ethics is 24302.

5.4 Findings and Results for Study 1

As there are no previous studies on factors and requirements that motivate children to participate in online Arabic story-writing tools, an exploratory study was performed based on motivational theory, cultural, educational and technical perspectives. The study used an expert review and survey sequentially. The expert review was used to evaluate and identify additional requirements, while the survey was to confirm identified requirements. This section presents the results and discussions for both the expert review and survey.

5.4.1 Findings from Expert Review for study 1

The interview was conducted to validate the existing factors and components, as well as explore new factors and components that motivate children to participate in online Arabic story-writing tools. The results are divided into two parts: demographic information and qualitative data.

5.4.1.1 Demographic Information

Initially, the interview invitation was sent to 20 experts via email to participate into the study and to find out to what extent the suggested factors and components will motivate children to participate in online Arabic story-writing tools. Only 13 experts answered and agreed to participate in the study while seven experts accepted but did not respond on the day of the interview. All experiences for experts exceeded five years. Most of the interviews were conducted in December and January 2016,2017. Some of the interviews were conducted face-face but most of them by using Skype. The interview was recorded by using an application called ‘simple recorder’. Permission for audio recording was requested of to the interviewees. The demographic information for the experts is presented in Table 5-3 and their domain in Table 5-4.

Table 5-3 Demographic information of experts

Variables	Countries	Frequency	%
Country	Saudi Arabia	11	84.6%
	Jordan	2	15.3%
Domain	Developers	2	15.3%
	Academics	4	30.8%
	Arabic teachers	7	53.8%
Experience	More than 5 years	13	100%
Working with children from 9-11 years	Yes	13	100%

Table 5-4 Interviewees' involvement based on expert domain

Domain	Job descriptions	Experts code
Developers	Developers in popular applications, interested in stories for Arab children	A, E
Academics	Researcher in instructional technology	C
	Researcher in childhood studies	K, M
	Researcher in instructional technology and writing Arabic stories	L
Arabic teachers	Arabic teachers at primary schools in Saudi Arabia	B, D, F, G ,H ,I ,J

5.4.1.2 Qualitative Data

Thematic analysis was undertaken form the obtained data of the semi-structured interviews. The researcher undertook the process of coding in an independent manner, which involved managing the data by hand, as no computer software was used because both Arabic and English were spoken during the interview process. Subsequently, the interviewer manually transcribed the interview transcripts and created a pre-formulated document, which provided the possibility to commence the coding process and to identify emerging themes. Following this stage, the researcher reviewed the tapes in order to perfect the transcript, which were reviewed again by the researcher before assigning codes to the recurring themes.

The codes were assigned in order to become reflective of the participants' actual utilised words, which were processed through data reduction, where more substantive codes were produced and clearer categories defined. In addition, colour coding of the categories was used to show the participants' pathway through the transcripts, which functions with the 'fit' of categories in

accordance with Parahoo (1997, p.357), who stated "all instances of the phenomena under question related to the developing category and the fractured data come together as coherent whole". Accordingly, the meaning and accuracy of the categories would ultimately become more understandable by studying the data and reviewing the original transcripts (see Appendix C for an annotated transcript example).

Following an inductive analysis of the data, three major themes were derived from the collected data during the conduct of fieldwork.

There are three major themes that appear to contribute to shaping the requirements that motivate children to participate in Arabic online story-writing tools:

1) Sustainable requirements for motivating children and support them before, after and whilst writing stories in online story-writing tools, which describe concept and strategies such as obtaining children's attention, establishing relevant strategies, Gaining Children's confidence, and obtaining children's satisfaction.
2) Educational requirements which explain the educational requirements to motivate children to do a task in an educational context such as Teacher role, Learning management system, and social presence.
3) Technical requirements describe the technical requirements in online story-writing tools that motivate children to do task such as usability for Arab culture, and usability for children. final themes and codes of expert interviews

Summary of the result of thematic analysis is shown in Appendices D. Table 5-5 shows the final themes of expert review.

Theme 1: Sustainable Requirements

The sustainable elements describes the requirements that sustain children's motivation before, after and whilst writing the story in online story-writing tools. Sustainability requirements are chosen based on John Keller's ARCS Model of Motivational Design Theories (Keller, 1987b, 1987a, 2009). ARCS Model has four steps for promoting and sustaining motivation in the learning process: Attention, Relevance, Confidence, and Satisfaction (ARCS).

- **Sub-theme: Gaining Children's Attention**

All 13 experts agreed that gaining a child's attention is an important requirement that could motivate children before starting writing activity in online story-writing tools. Two experts explain the reasons of this importance:

Table 5-5 the Final themes of expert review

Theme	Subtheme	Codes & Items
Sustainability requirements	Obtaining children's Attention	• Visual representation • Examples • Brainstorming and organising techniques • Adding various topics of stories • Use interactive material or multimedia • Brief gaming activity • Reading stories
	Establishing relevant strategies	• Familiarity for the children • Give children the choice to write a story • Examples and presentations of successful work done by previous children • Suitable for the children's level • Vocabularies that reflect the language of the children • Visual cues and symbolic thoughts reflect values, knowledge and beliefs of a group of children
	Gaining Children's confidence	• Self-evaluation • Challenging tasks • Frequent and varied activities • Sufficient feedback • Children independence
	Obtaining Children's satisfaction	• Praise for successful progress or accomplishment • Varied the schedule of reinforcements • Motivating feedback (praise) immediately following task performance
Educational requirements	Teacher role	• Assess and evaluate children's work • Feedback and comment • Reward students' work • Manage the number of students undertaking the activity • Design and modify storytelling activities • Communicate electronically with colleagues, parents and children • Sharing children's work with their parents
	Class management	• Secured system • Creation of teams to accomplish a task • Developing smaller learning communities • Recognised and rewarded children
	Social presence	• Parents' recognising and rewarding their children's work • Receiving notifications of peers' achievements • Collaborating with colleagues, teachers and parents
Technical requirements	Usability for Arabic language and Arab culture	• Writing with diacritical marks • Provides the ability to change the language setting to gender-specific language • Visual library that reflects Saudi culture
	Usability for children	• gender-based differences • video-based help • funny, colourful, encouraging and entertaining content • easy and simple to use • Font easy to customise • customising the look of the personal avatar

Expert K: "*Gaining a child's attention has an important role because it will reflect on them positively and it makes them observing carefully, visualising, analysing and thinking creatively."*

Expert M*: "Getting a child's attention is required to write a sequential story."*

Nine experts suggested strategies to gain children' attention and motivate children before starting the writing activities. Codes of this sub-theme include: visual representation, examples, brainstorming and organising techniques, adding various topics of stories, use interactive material or multimedia, brief gaming activity, and reading stories.

- **Sub-theme: Establishing Children's Relevance strategies**

Twelve of the thirteen agreed this is an important requirement that could motivate children before starting writing activity in online story-writing tools. Two experts explain the reasons of this importance:

Expert A: *"There is no doubt that, if it is related to the child, it will be easy to write a sequential story."*

Expert B: *"Children's interests and imagination are different from child to child. So, using strategies that relevant to the children could affect their production positively."*

Seven experts suggested strategies that related to children's interests and motivated children at the same time. Codes of this sub-theme include familiarity for the children, give children the choice to write a story, examples and presentations of successful work done by previous children, suitable for the children's level, vocabularies that reflect the language of the children, visual cues and symbolic thoughts reflect a group of children.

- **Sub-theme: Gaining a Child's Confidence**

Twelve of the thirteen agreed that confidence an important requirement that could motivate children before and after starting writing activity in online story-writing tools. Two experts explain the reasons of this importance:

Expert C: "*Yes confidence is very important not only for children but for adults as well. Because if you do not confidant, you will not do anything. For children, it is true that confidant is important, but here comes the role of the teacher, how to motivate the child and how to raise his self-confidence"*

Expert G: "*Every person who is confident will do everything. Applying strategies to gain children' confidence, will let them produce more"*

Nine experts recommended confidence strategies that help children in terms of building up positive attitudes and expectancy toward success in online tools. Codes of this sub-theme include self-evaluation, challenging tasks, frequent and varied activities, sufficient feedback, and children independence.

- **Sub-theme: Obtaining Child Satisfaction**

All agreed that satisfaction is an important requirement that could motivate children after writing activity in online story-writing tools. One expert explains the reasons of this importance:

Expert C "*child satisfaction is required because if the child be satisfied they became engaged in the process of writing and then in the tool as well. So, applying strategies that linked to reinforcement can be getting children' satisfaction to motivate them to use the tool"*

Seven experts recommended satisfaction strategies that help children attain satisfactory feelings after carrying out tasks in online tools. Codes of this sub-theme include: praise for successful progress or accomplishment, varied the schedule of reinforcements, and motivating feedback (praise) immediately following task performance.

Theme 2: Educational Requirements

Considering that educational requirements to motivate children to do tasks in online story-writing tools are at the heart of educational context. The context in which children supported in online environment as same as educational environment. Thus, this theme highlights the educational requirements in three contexts: teacher role, class management, and social presence.

- **Sub-theme: Teacher Role**

All experts agreed that teacher role is that could motivate children whilst writing activity in online story-writing tools. One expert explains the reasons of this importance:

Expert M: "*The teacher's role is essential because if the teacher was creative and knew the characteristics of the child, he will consider things, for example, imagination or fear of certain things in the child. The creative teacher is able to employ the child's imagination and fear of certain things by writing stories*"

Eight experts recommended teacher role that help to carry out tasks in online tools. Codes of this sub-theme include: assess and evaluate children's work, feedback and comment, reward students' work, manage the number of students undertaking the activity, design and modify

storytelling activities, communicate electronically with colleagues, parents and children, and sharing children's work with their parents.

- **Sub-theme: Class Management**

Ten of the thirteen agreed class management is an important requirement that could motivate children whilst writing activity in online story-writing tools. One expert explains the reasons of this importance:

> **Expert C**: *"managing the class is an important requirement because teachers need to control written stories of a large number of students or divide them to groups. Also, sometime we need to integrate between weak and advanced children as this kind of cooperation can motivate them"*

Four experts recommended methods to managing classes electronically. Codes of this sub-theme include: secured system, creation of teams to accomplish a task, developing smaller learning communities, and recognised and rewarded children.

- **Sub-theme: Social presence**

All agreed that social presence is an important requirement that could motivate children in online story-writing tools. One expert explains the reasons of this importance:

> **Expert D**: "Parents often have a positive impact on the child, but it is not always the case with friends. For example, when the child begins to write the story, he should first show it to his parents and teacher to become satisfied and confident, then he is free to show his friends."

Four experts recommended features to deliver a sense of connection with others. Codes of this sub-theme include: parents' recognising and rewarding their children's work, receiving notifications of peers' achievements, and collaborating with colleagues, teachers and parents

Theme 3: Technical Requirements

This theme describes the technical requirements in online story-writing tools that motivate children to do task. This theme highlights the user interface characteristics and discusses experts' reporting of usability for user interface in two contexts: usability for Arab users and usability for children.

- **Sub-theme: Usability for Arab users**

All agreed that the usability for Arab culture and Arabic language is an important requirement that could motivate children in online story-writing tools. Two experts explain the reasons of this importance:

Experts E *"because if the tool will be for Arab users, it must be the user interface support Arabic Language and Arab culture. For example, diacritics marks are an essential part of the Arabic language and give a greater meaning to the sentence. So, children might need these marks to be in the user interface to write the stories easily. Also, the library of images must involve images that related to the Arab culture"*

Six experts suggested user interface features to achieve the cultural requirements for Arabic users, specifically for Saudi users. Codes of this sub-theme include: Writing with diacritical marks, Provides the ability to change the language setting to gender-specific language, and Visual library that reflects Arab culture

- **Sub-theme: Usability for children**

All experts agreed that usability for children is an important to motivate children whilst using online story-writing tools. Two experts justified the reasons of this importance:

Experts A and E mentioned that user experience specialists recommend segmenting children into at least three groups based on their cognitive, physical and social abilities: ages 3-5, ages 6-8 and ages 9-12. So, usability for ages 9-12 is an important requirement that needs to be addressed in designing the app, website or devices.

Five experts recommended adding features to the user interface that make tools easy to use by children. Codes of this sub-theme include: considering gender-based differences, adding video-based help, designing funny, colourful, encouraging and entertaining content, easy and simple to use, Font easy to customise, and customizing the look of the personal avatar.

5.4.2 Survey Results for Study 1

Self-administered on-line questionnaires were used to confirm the requirements that resulted from the literature and expert review. The online questionnaire was carried out in March 2017. It consisted of two parts: demographic and requirements confirmation questions.

5.4.2.1 Analysis of Demographic Information

The demographic questions were divided into two sections. The first section of the questionnaire required respondents to give information about their job, educational level and region.

Additionally, to determine whether the respondents qualified to complete the survey or not, there was a specific question asked. This was whether the respondent had previous experience of dealing with children from 9-12 years old. The qualified respondents were chosen based on the previous question and the years of experience. If the years of experience were more than three years, they were included in the study.

By the end of the survey period, data had been collected from 325 individuals. The majority of respondents (90.15%=293) were qualified to complete the survey, with 244 (83.28%) respondents having experience of three years or more with children at that age. Some of the surveys were received from respondents who had selected more than one choice to determine their relationship or experience with children. For example, total of 188 parents were answered the questions; (70 both parents and teachers), (14 both parents and researchers), (3 both parents and psychologist), (8 both parents and others) and 93 just parents. Table 5-6 shows the demographic information of respondents .In addition, almost two-thirds of them (63%) have a bachelor degree, while 10% of them have a master degree and a minority of participants (6%) have a doctorate of philosophy. The survey was received from all regions in Saudi Arabia. Figure 5-4 illustrates the response rate based on Saudi regions.

Table 5-6 Demographic information of practitioners

Respondents	Total of answer	% of answers	No of parents	No of teachers	No of researchers	Psychologists	No of others
Parents	188	77.05%		70	14	3	8
Teachers	103	42.21%	70		11	1	3
Researchers	21	8.61%	14	11		0	3
Psychologists	5	2.05%	3	1	0		1
Others	23	9.43%	8	3	3	1	
Total	**244 respondents**						

The second section of the questionnaire required respondents to indicate information that related to the child, such as the educational system that the child's school follows, school type and whether the child was interested in digital stories or not. Most of the children were enrolled in public schools, which are free as well as managed by the Saudi government. The majority of children (91%) followed the Saudi national educational system. Approximately 30% of those who responded to this question showed that their child had an interest in writing a digital story, and the same rate of response was not sure if their child was interested. However, 43% of those surveyed did not believe that their child had an interest in writing a digital story.

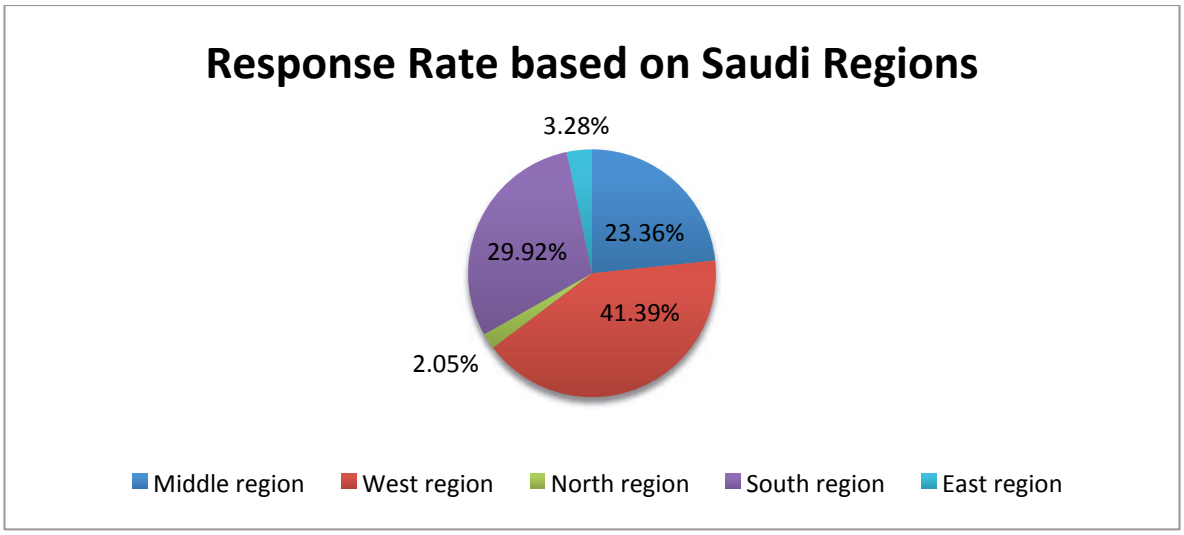


Figure 5-4 Response Rate based on Saudi regions

5.4.2.2 Analysis of the Requirements

This purpose of this part is to confirm the 9 requirements that resulted from the closed-ended questions. Each question has a five-point Likert Scale (strongly agree=1, agree=2, neutral=3, disagree=4, strongly disagree=5). SmartSurvey was used to collect data as well as analyse the mean and frequencies of responses. SPSS is used to analyse the collected data, which was tested by using a one sample t-test. One sample t-test is used to compare the population mean (μ) with the hypothesised mean (μ0). The hypothesised mean is equal to the neutral value in the Likert Scale, which is (μ0) =3.

The hypotheses that will test each requirement are as follows:

H_0 if the mean of proposed requirement is <3 and p-value < the statistical significant level alpha ($\alpha = 0.05$), it accepts the null hypothesis and the requirement significantly affects on the child's motivation whilst writing stories in online story-writing tools.

H1: if the mean rating of proposed factor >=3 and p-value ≥ the statistical significant level alpha ($\alpha = 0.05$), it rejects the null hypothesis and the requirement does not significantly affect the child's motivation whilst writing stories in online story-writing tools. The summary of the hypotheses is represented in Table 5-7.

Table 5-8 provides the results of questionnaire from each component. It is apparent from this table that all related to sustainable, educational and technical significantly affects the child's motivation whilst writing stories in online story-writing tools. All the results of components show a mean <3 and the p-value < 0.05.

Table 5-7 The summary of the hypothesis

Hypothesis	Condition 1	Condition2	Result
H0: accepted	Is the mean statistically different from 3	P-value < α = 0.05	Statistically significant
H1: rejected	Is the mean statistically different from 3	P-value>= α = 0.05	Not statistically significant

Table 5-8 Analysis of factors using one sample t-test

Categories	Factors	N	Mean	Sig.(2-tailed)	Result
Sustainable elements	Gaining children's attention	244	1.5	< 0.001	Statistically significant
	Establishing relevant strategies	244	1.52	< 0.001	Statistically significant
	Gaining Children's confidence	244	1.51	< 0.001	Statistically significant
	Obtaining children's satisfaction	244	1.65	< 0.001	Statistically significant
Educational elements	Teacher role	244	1.51	< 0.001	Statistically significant
	Class Management	244	1.42	< 0.001	Statistically significant
	Social Presence	244	1.56	< 0.001	Statistically significant
Technical elements	Usability for Arab Users	244	1.56	< 0.001	Statistically significant
	Usability for Children	244	1.48	< 0.001	Statistically significant

5.5 Discussion of the confirmation study

The study goal is to confirm that existing factors and components in the proposed SETr framework are significant to motivate children whilst writing stories in Arabic when using online story-writing tools. Factors and components are explored through asking questions that are shown in Table 5-2. In the interview, experts were asked about missing factors or components. Some experts suggested additional components that considered items within existing components. Then the SETr framework is confirmed through the response on the questionnaire given to people who are working with (9-12 years old) children. Thus, discussion for each of the factor (F1, F2, F3), triangulated of literature, interviews, and surveys, presented as follows;

F1: Sustainable Requirements

The SETr framework in chapter 4 suggested a sustainable factor for motivating children in the process of writing stories. The ARCS model was applied to create a more attractive learning environment and to enhance a learner's motivation (I. C. Hung et al., 2011). Specifically in this

study, the ARCS model was applied to know the requirements that can sustain children's motivation before and after the process of writing stories in the online tool. Four elements based on the ARCS model are used to assess or design story-writing tools. There are obtaining children's attention, establishing relevant strategies, gaining children's confidence and obtaining children's satisfaction.

The analysis showed that the experts' opinions and survey matched the suggested framework. They also suggested strategies inside each element. However, these strategies (items) are different from Keller's strategies on the ARCS model because strategies are general but unsuitable to motivate children in the process of writing stories in online storywriting tools. These strategies are incorporated as items that could provide teachers with motivational strategies to assess an appropriate story-writing tool and to motivate children to use it. Moreover, considering all the suggested strategies could strengthen the design of Arabic online story-writing tools.

F2: Educational Requirements

Different requirements in an educational context were investigated that focused on socialising and getting help which could motivate children in using story-writing tools. According to sociocultural theory and self-system theory, social interaction can be a great opportunity to develop children's cognitive skills (Vygotsky (1978); as well as to support three psychological needs: relatedness, autonomy, and competence (Connell & Wellborn, 1991; James P Connell, 1990; R. Ryan & Deci, 2000a). To increase children' motivation, one needs to provide them with three important tasks: involvement, support of autonomy, and support for the development of competence. For example, the child needs to be provided with assistance, coaching, questioning, and guided participation as a form of scaffolding. Therefore, the more knowledgeable peer or teacher needs to monitor the child and support child' needs (*more details in chapter 3.3*).

In the SETr framework, teacher role, class management and social presence are suggested as educational requirements to motivate children in story-writing tools. However, these three requirements are considered important based on studies in the school environment but not in the online environment. Therefore, experts were asked about the importance of these requirements in the online environment to motivate children. They considered that all the requirements are important. The survey also agreed with these requirements. All expert reviews and surveys showed that educational requirements for children in an online environment were parallel with that in the school environment. Based on the thematic analysis in Table 5-6 in section 5.4.1.2, they suggested strategies to achieve these requirements, which need to apply in the online story-writing tools. All experts' results and strategies that resulted from thematic analysis were elaborated to generate the items for developing the SETchecklist (chapter 6.1.2)

F3: Technical Requirements

System usability was perceived as a way that could affect participation, as well as intrinsic motivation (Xie et al. 2006). Meanwhile, Stoney and Wild (1998) noted that when the user interface when it is poorly designed, students are unable to become intrinsically motivated in order to make use of the product or to learn from it. They show that interfaces motivate learners when they are easy-to-use, challenging, engaging, and realistic.

The SETr framework suggested usability for Arab users and usability for children as separate components. Both components focused on the characteristics of the user interface in the tool. In order for this study to be focused on Arab children who are 9-12 years old, specific guidelines and principles need to take into account that they are related to the children motivation. Therefore, Experts review suggested specific guidelines for each requirement, which were considered as items (see Table 5-6 in section 5.4.1.2).

5.6 A Confirmed SETr Framework

The SETr framework was confirmed by using exploratory sequential mixed methods, which were discussed in section 5.5. Analysis of the interview and the survey indicated that there was no requirement that needs to be added or excluded in the framework. In addition, there are suggestions from experts for each requirement about how to apply it into the tools. These suggestions are codded as items to describe each requirement. The new framework with items is presented as Table 5-10. The confirmed SETr framework shown in Figure 5-5

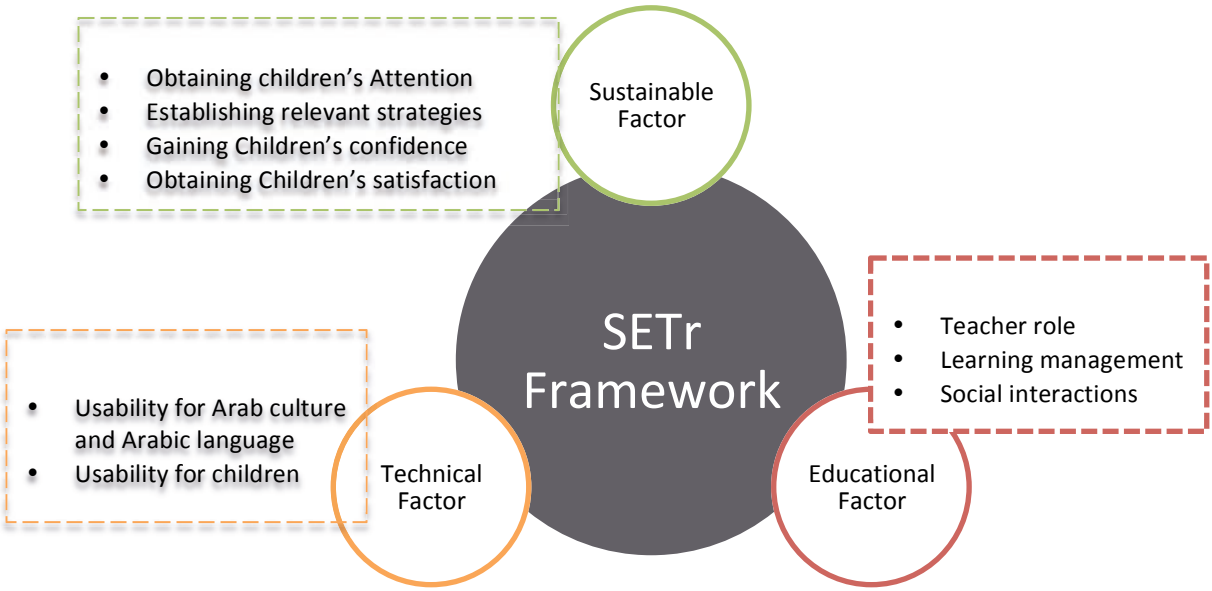


Figure 5-5 the Confirmed framework

5.7 Summary

This chapter has described the methodology used to confirm and refine the content of the framework. It presented the research approaches such as triangulation approach and sequential procedure that is used in the study. It described the data analysis that was used in this study such as thematic analysis and statistical analysis. It has explained interview and survey design, the sample size, participants' backgrounds, design and the procedures of expert review and survey and research ethics.

This chapter also has presented the data analysis, the results and the findings from the experts review and survey. From the expert review, the majority agreed on all proposed components. Moreover, six components are suggested to add into existing components, but these components are coded as items within the existing components. Then, components were confirmed via survey results, which revealed that all components were statistically significant. Therefore, the new version of the framework, after confirmation and refining, consisted of nine components and was categorised into sustainability, educational, and technical requirements.

Chapter 6 Study 2 Development of the Sustainable, Educational Technical Checklist (SETcl)

In chapter Five, a study was confirmed by using the triangulation of experts' interviews; a survey with those working directly with children [such as children's parents, teachers, psychologists and researchers]; and a literature review of theories and practices in children motivation based on psychological, educational, cultural and technical perspectives. This chapter presents the development process of an instrument of sustainable Educational Technical Checklist (SETcl, which can be used by teachers to measure the potential extent of applying sustainable, educational and technical requirements in Arabic web-based story-writing tools that motivate children. Specifically, SETcl is used to answer the second research question:

- ***What is an appropriate instrument to support Arab teachers in identifying and assessing Arabic web-based story-writing tools that motivate children?***

SETcl was developed through a stepwise approach, as well as by using the framework of Sustainable, Educational and Technical requirements (SETr) as a guide and reference. This chapter presents the development process of the checklist, the methodology and the approach.

6.1 Measuring Sustainable, Educational and Technical Requirements in web-based tools

To validate the use of the SETr framework, a set of metrics has been developed and validated which has subsequently been formulated as a checklist or instrument. This checklist measures the extent of applying sustainable, educational and technical elements in web-based tools in order to motivate children to write stories. Consequently, this checklist will help teachers in determining appropriate web-based tools for motivating children whilst writing stories. Moreover, this checklist can inform the developer or designers in designing these requirements for web-based tools. Also, it can help to understand the extent of the suitability of the web-based tools for children.

To achieve this, all factors and components within SETr framework were used to develop the checklist. Metrics development followed two steps:

- The first step was to define the factors and components for the SET checklist;
- The second step was items generation for the SET checklist.

6.1.1 Identifying Factors and Requirements

After analysing the framework of (SETr) as a guide and reference, all three factors were selected for inclusion in the instrument in order to measure the extent that the web-based tools for children possess these requirements (see Table 6.1). Each of the factors is defined as follows:

I. The factor of sustainable elements, which describes the requirements that sustain children's motivation pre- and post- activity of writing stories in web-based tools.
II. The factor of educational elements, which describes the educational requirements that relate to how children are socialised and gain help to undertake tasks that can motivate children in completing tasks.
III. The factor of technical support, which describes the technical requirements in web-based tools, which relate to the user's interface design that motivate children to use the web tool.

Following the factors, a total of nine requirements were derived, where four requirements were for sustainable elements, three for educational elements, and two for technical elements. The description for each of those requirements is presented as follows:

1. Strategies for Children's Attention (OCA)

In the SETr framework, obtaining children's attention is the process of developing strategies to gain children's attention in order to complete tasks. It is one of the elements that has been adapted from the ARCS model by Keller (Keller, 2009). The ARCS model outlines elements to measure and grabs learners' attention that includes active participation, variability, humour, incongruity and conflict, specific examples and inquiry. A survey instrument reflected the ARCS model called IMMS that was validated and tested in different contexts, such as computer assisted instruction and distance education to measure motivational problems within instructional tools (Bolliger et al., 2010; Di et al., 2013; Huang & Hew, 2016; Huang et al., 2006; Rodgers & Withrow-Thorton, 2005). However, this survey functions generally in assessing the web-based tools for specific purposes, and thus, customisation is required to be included in SETcl. New items for attention were developed to be suitable for assessing the web tool in this research by referring to expert review suggestions (see Chapter 5.4.1.2) and using the approach for items generation.

2. Strategies for Establishing Children's Relevance (ECR)

According to the SETr framework, establishing children's relevance is one of the components that have been adapted from ARCS model. This component investigates the ways in which the content

of a web tool relates to a child's interests. In the ARCS model, strategies are outlined in order to establish relevance in instructional tools, such as goal orientation, motive matching, and familiarity. These strategies help learners to be motivated to accomplish tasks; all those strategies are used to provide an indication to generate suitable and related items for SETcl. Items were added based on expert review suggestions (chapter 5.4.1.2)

3. Strategies for Gaining Children's Confidence (GCC)

The SETr framework also demonstrated the importance of gaining children's confidence by using strategies that help learners build up a positive attitude and expectancy toward success. Sachs (2001) discussed the impact of confidence levels on learners' abilities to perform well, while Wigfield and Eccles (1992) investigated the relationship between success in the classroom and learners' confidence about being able to learn. The ARCS model suggested strategies to obtain learners' confidence, such as learning requirements, success opportunities, and personal control. In the ARCS model, a survey instrument called IMMS measures items to improve confidence in the instructional tools. However, this component is intended to measure to what extent the web-based tools have strategies in order to gain learners' confidence. Additionally, by referencing the ARCS strategies, expert review suggestions, and IMMS items, the new items will be generated.

4. Strategies for Obtaining Children' Satisfaction (OCS)

Obtaining children satisfaction is one of the elements in the SETr framework that has been adapted from the ARCS model. Satisfaction in the ARCS model refers to the strategies that help learners attain satisfactory feelings after completing tasks, such as using natural consequences, positive consequences, and equity. This component is intended to measure to what extent web-based tools have strategies to help children attain satisfactory feelings after writing the story. By referencing ARCS strategy, expert review suggestion and IMMS items, the new items generated in SETcl will be suitable to assess the web-based tools for the current research.

5. A Teacher's Role (TER)

For the inclusion in the SETr framework, this component would attempt to investigate teachers' options for facilitating children's motivation to write stories in web-based tools. Various studies have demonstrated the important role played by the teacher to facilitate children's motivation and engagement in learning, such as the interaction between students and teachers (Martin & Dowson, 2009; Wentzel, 1998). Researchers have reported five aspects of teacher-student interaction that might engage children's motivation if used effectively; namely, teacher's feedback (Rosenshine, 1982); rewards (Skinner, 1953; Bandura, 1989); classroom climate

(Cornelius-White, 2007); praise (Skinner, 1953; Brophy & Good, 1986); and unsolicited help (Newman, 2000). Children will improve their writing only in response to feedback, which may be provided either by teachers or peers (e.g. Hillocks, 1982; Trushell, 1986). This component aims to measure the extent that web-based tools provide teachers with the options to facilitate the process of children's motivation. Thus, the current research will create items to be included in SETcl.

6. Class Management System (CMS)

In the SETr framework, research has found that teachers commonly employ different forms of activity structures within their classrooms. Moreover, a variety of different rules and expectations, which could be either explicit or implicit in regards to instructions, classroom management, student–teacher interaction, and communication among students, relate to each form of activity. Extensive research has been undertaken in regards to academic assistance, which seeks to incorporate small-group work and collaborative activities, as this promotes the relative frequency of requests for assistance. Even though classroom management elements can motivate children in educational contexts, an investigation is still required to apply a class management system in web-based tools from e-learning practices. For inclusion in SETcl, new items will be generated to investigate the extent to which web-based tools offer class management systems for children electronically.

7. Social Presence (SOP)

Social presence is one of the significant requirements in the SETr framework. Research has demonstrated that children's academic motivation is improved when parents allow children to have input into decisions; state expectations as suggestions; acknowledge children's feeling and needs; and provide children with alternatives and choices (Dornbusch et al., 1987). Comparatively, social cognitive theory clearly addresses the peer effects on student motivation. There are studies that show linkage between peers' relationship and academic competence (Altermatt & Pomerantz, 2003; Ladd et al., 2009; Wentzel, 1998). Furthermore, research has mentioned that the presence of both social interaction and collaboration contributes to an increase in the effectiveness of literacy instruction (Dugan, 1997). This component can potentially measure the extent that web-based tools have features to deliver a sense of connection with others. By referring to expert review suggestions (see Chapter 5.4.1.2) and reviewing children's collaboration and social interaction practices in similar web-based tools (Al-Mousawi & Alsumait, 2012; Göttel, 2011; Simões et al., 2012; Stanton et al., 2001), new items will be generated.

8. Usability for Arab Users (UAU)

According to the SETr framework, this component helps to investigate the cultural requirements for Arabic users in particular. Several studies have been conducted regarding the challenges of the usability for Arabic users in terms of localisation of the language, culture, language processing and user interface design (Al-Wabil et al., 2006; Khasawneh, 2014; Mahfoudhi et al., 2011; Muhanna, 2014). However, usability problems can undermine user' motivation and terminate user interaction at this stage; thus, careful design is vital. This component will be able to measure the extent that web-based tools achieve cultural requirements for Arabic users. For inclusion in the SETcl, expert review suggestions (see Chapter 5.4.1.2) and usability practices for Arab users in similar tools (Al-Mousawi & Alsumait, 2012; Muhanna, 2014) will be used as a guidance to generate new items.

9. Usability for Children (UCH)

The SETr framework indicates that the usability for children is an important requirement to motivate children to write stories. The reason is that most existing guidelines and principles are formulated based on the needs of adults, and not on the needs of children. Considering children's needs, the tool must have easy usability in order to counteract a child's poorer ability. Nevertheless, many researchers have paid more attention to the specifics of how to design technology for children (Alfadhli & Alsumait, 2015; Alsumait & Al-Osaimi, 2010; Chiasson & Gutwin, 2005; Nielsen, 2010). These researchers have suggested guidelines to meet children's needs, such as language, cognitive, physical, and social needs. However, these guidelines are general for all technologies and not specifically used for web story-writing tools. This component would like to find the extent to which web-based tools are easily used by children. By referring to expert review suggestions (see Chapter 5.4.1.2) and referencing usability practices for children, the items will be generated.

All factors and their requirements are listed in Table 6.1.

6.1.2 Items Generation

Items generation was the second step that was conducted to develop the checklist. The process of items generation followed a systematic approach to develop a new metric for the SET checklist. A Goal- Question-Metrics (GQM) approach was applied in previous related studies, which was used to create the instrument or metrics for the framework. In order to develop the usability metric for mobile applications, A Goal-Question-Metrics (GQM) approach was utilised in mobile usability research (Hussain & Ferneley, 2008). Basili, Caldiera, and Rombach (1994) initially introduced the GQM approach, which was used through a systematic approach in order to define the measurement framework (Hussain & Ferneley, 2008). The GQM approach was mainly applied to

processes of measurement, as well as different products and resources in software projects, where the approach was designed to achieve the particular requirements of a set software project (Basili et al., 1994). Additionally, GQM provides an approach that helps to focus on different measurement problems (Hussain & Ferneley, 2008; Subramanian & Geetha, 2011). What is more, as the SET checklist was not developed yet, the GQM was applied to create a new metrics for the SET checklist.

Table 6-1: Lists of Factors and its Requirements

Factor	Requirements
Sustainability Elements	Obtaining Children's Attention (OCA) Obtaining Children's Relevance (ECR) Gaining Children's confidence (GCC) Obtaining Children's Satisfaction (OCS)
Educational Elements	Teacher's role (TER) Class Management System (CMS) Social Presence (SOP)
Technical Elements	Usability for Arab Users (UAU) Usability for Children (UCH)

6.1.2.1 Goal-Question-Metrics (GQM) Approach

GQM is a mechanism that defines and interprets metrics to evaluate a software product. This approach is adapted to measure the extent that web-based tools have the requirements to motivate children whilst writing stories, as it is a basic method in software measurement and provides a clear derivation from goals to measurements. The mechanism focuses on achieving a goal-oriented measurement where all acquired data must be derived to achieve a desired goal by quantifying them. In the GQM mechanism, there are three levels that work as top-down procedures to determine the metrics: conceptual level (Goal); operational level (questions); and quantitative level (Metric).

- Conceptual level (Goal)

A goal is defined for an object, for a variety of reasons, from various perspectives and relative to a specific environment.

- Operational level (Question)

A set of questions is used to define models of the object of study and then focuses on that object to characterise the assessment or achievement of a specific goal.

- Quantitative level (Metric)

A set of metrics, based on the models, is associated with every question in order to answer it in a measurable way.

6.1.3 Implementations of GQM Approach

In the current research, the SET checklist followed the GQM approach. Firstly, goals were identified based on descriptions of elements in Section 6.1.1. Secondly, based on the goal, questions were created to achieve this goal. Thirdly, metrics were identified to answer this question. In this research, metrics considered the main point to answer the question and achieve the goal. These detailed metrics became items to measure the elements. Figure 6-1 illustrates the structure of the GQM approach in order to generate items for the SET checklist.

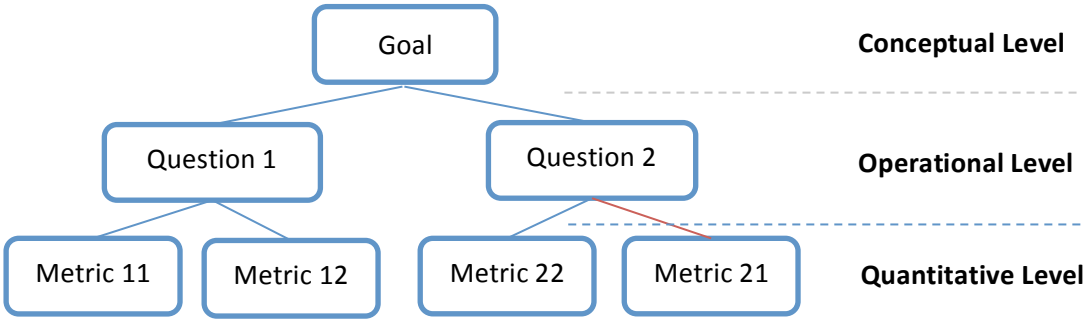


Figure 6.1: The Diagram of GQM

For example, one element was chosen to explain the steps of the items' generation in the SET checklist. This element is to obtain children's attention (OCA), which is considered one of the elements of sustainable factors. Based on OCA descriptions in Section 6.1.1, the goal of OCA is to assess the extent to which web-based tools have strategies to attract children's attention before starting the activity of writing stories. As a result of this, one question has been asked, which is: "What are the strategies that can be applied in web-based tools that attract children's attention before starting the activity of writing stories?". The metrics were created based on the question and the result from thematic analysis of expert reviews in Chapter 5.4.1.2, Table 5.5. The goal, question and metrics for the previous example are presented in Table 6.2.

All elements have applied the GQM approach in the same way as the OCA element. The detailed goal, questions and metrics for all elements to generate items for the SET checklist are presented in Appendix E. For 9 elements, 62 items are generated. Table 6.3 below illustrates a total number of items that have been generated for each requirement.

Table 6-2: Example of generated metrics and items for OCA using GQM Approach

Factor	**Sustainable Requirements**
Elements	Obtaining children's attention (OCA)
Goal	Assessing the extent to which web-based tools have strategies to attract children's attention before starting the activity of writing stories

Questions	Metrics
What are the strategies that can be applied in web-based tools that attract children's attention before starting the activity of writing stories?	The tool has visual representations, such as pictures
	The tool has different types of examples
	The tool includes brainstorming and organising techniques, such as storyboarding and story mapping
	The tool has various formats of storytelling, such as a long form (more text, fewer images) and short form (more images, less text)
	The tool allows the addition of various topics
	The tool allows the addition of concrete vocabularies
	The tool allows for the use of interactive materials or multimedia
	The tool involves a brief gaming activity
	The tool involves reading stories

6.1.4 Response Item

To respond to each of the items in the instrument, a five-point Likert Scale is used for all the statements. The reason for choosing a 5-point rating was referred to in Chapter 5.2.2.1. Based on the nature of the items that acquire teachers' opinions about the SET checklist applicability in web-based tools, the agreement with the following ratings was used:

1. Strongly agree (Rating Scale=5)

The highest scale that indicates a total agreement to the application of motivational requirements for children in the web story-writing tool; the scale shows an important effect to the items in the SET checklist.

Table 6.3: Total number of generated items for each requirement

Factor	Requirements	No of items
Sustainability Elements	Obtaining Children's Attention (OCA)	9
	Establishing Children's Relevance (ECR)	6
	Gaining Children's Confidence (GCC)	6
	Obtaining Children's Satisfaction (OCS)	5
Educational Elements	Teacher's Role (TER)	8
	Class Management System (CMS)	6
	Social Presence (SOP)	6
Technical Elements	Usability for Arab Users (UAU)	7
	Usability for Children (UCH)	9
Total		62 items

2. Agree (Rating Scale=4)

The second highest scale that indicates an agreement to the application of motivational requirements for children in the web story-writing tool; the scale shows a satisfactory effect to the items in the SET checklist.

3. Neutral (Rating Scale=3)

The medium scale that indicates an undecided agreement to the application of motivational requirements for children in the web story-writing tool; the scale shows some effect to the items in the SET checklist.

4. Disagree (Rating Scale=2)

The second lowest scale that indicates disagreement to the application of motivational requirements for children in the web story-writing tool; the scale shows a minor effect to the items in the SET checklist.

5. Strongly Disagree (Rating Scale=1)

The lowest scale that indicates a total disagreement to the application of motivational requirements for children in web story-writing tool; the scale shows too little of an effect, or may not affect the items in the SET checklist.

6.1.5 The Instrument (checklist)

Once the metrics for sustainable, educational and technical requirements in web-based tools had been developed, the metrics and response items were formed to serve as an instrument (checklist) in order to measure the extent of applying sustainable, educational and technical requirements in web-based tools to motivate children whilst writing stories. In the SET checklist, teachers are asked to rate how much they agree or disagree with each item based on the elements' descriptions. For example: item one: the tool has various formats of storytelling, such as a long form (more text, fewer images), and a short form (more images, less text). The item refers to the element of obtaining children's attention (OCA), which is to assess the extent to which web-based tools have strategies for attracting children's attention before starting the activity of writing stories. Furthermore, teachers have to assess how much they agree or disagree with each item. The full instrument (checklist) in English and Arabic forms is presented in Appendix F.

6.2 Summary

This chapter presents the development of a sustainable, educational and technical checklist (SET checklist) in web-based tools, in order to motivate children whilst writing stories. The checklist has been created as an instrument to measure the extent of applying sustainable, educational and technical requirements in web-based tools. Items for the instrument were generated by using the Goal-Question-Metrics (GQM) approach and the results from the SET framework. As an initial step it was determined that 9 elements and 62 items were relevant. Subsequently, this instrument needs validation in order to ensure that these items measure the correct content. The validation process is presented in Chapter 7.

Chapter 7 Validating the Sustainable, Educational and Technical Checklist (SET checklist)

After designing the instrument, it was an important process to check the validity and the reliability in order to assess the instruments' items (Aladwani, 2014; G. Moore & Benbasat, 1991). The validity and reliability are independent processes, which means that if the instrument is valid, it may not also be reliable; and if the instrument is reliable, it is not necessarily valid (A. Field, 2013). The instrument's validity involves assessing the content and construct of the items, while the reliability consists of checking the internal consistency for the inter-item relationships. In this section, a study was designed to validate the Sustainable, Educational, and Technical Checklist (SETcl) instrument. The validation process followed an iterative procedure that involved three steps: content validity, pre-test, and then the validation experiment. Figure 7.1 below shows the validation process for the SET checklist.

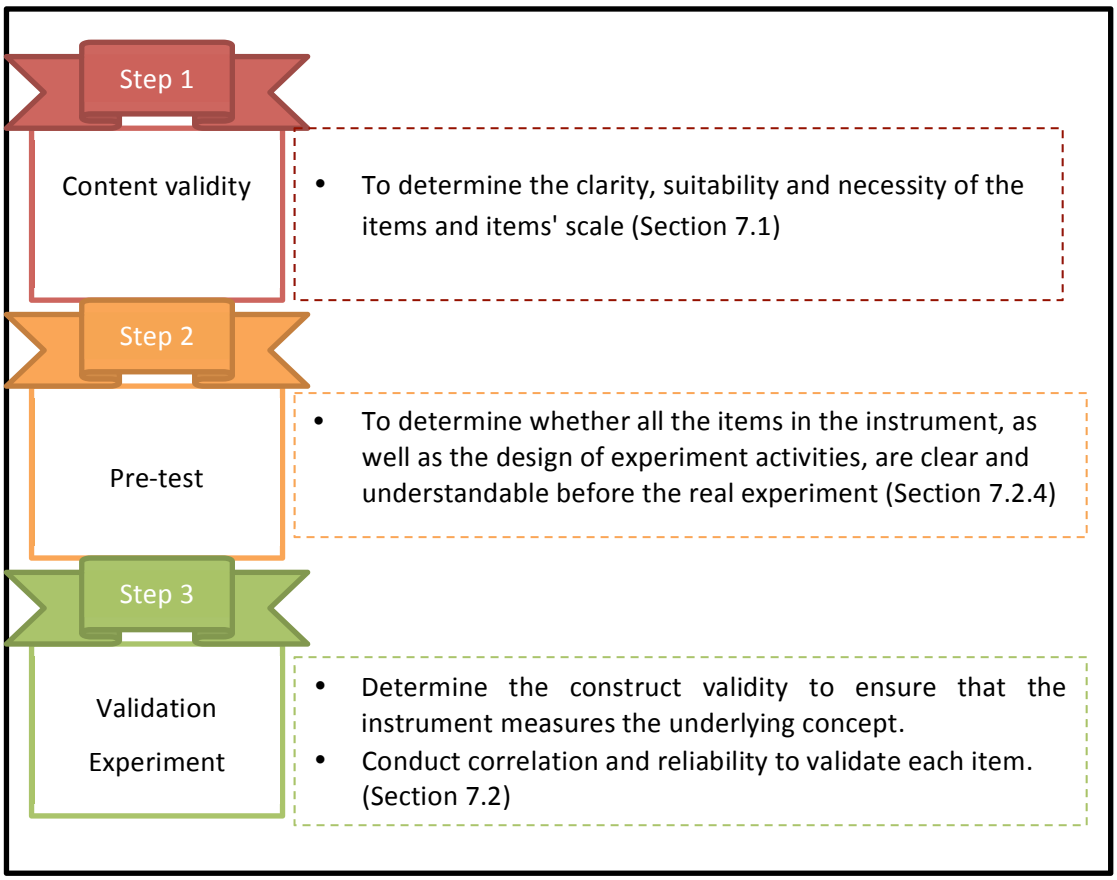


Figure 7.1: The Validation Process for the SET Checklist

7.1 Content Validity

The first step in the validation of the SETcl instrument is content validity, which is used to determine whether the instrument's items measure what is supposed to be measured. Content validity in the current study involves a judgement-quantification stage, which depends on the knowledge of experts, either in the particular content area or as researchers (Lynn, 1986).

7.1.1 Method

The instrument is assessed in three steps. The first step reviews the English versions of the instrument for technical quality, such as grammar, wording and structure. To achieve this step, the instrument has been sent for proofreading and editing. The second step translates the English version of the instrument into an Arabic version. The third step is used to formalise scaling procedures, which use multiple judgments of content validity and quantify judgments to assess the clarity and necessity (Lawshe, 1975; Lynn, 1986). For the purpose of evaluation, an email has been sent that consists of the instructions, study information, consent form, evaluation sheet, and SETcl instrument. On the evaluation sheet, each item of an assessment instrument should be judged by two things:

1. The necessity of the item
2. The suitability of the scale item

The evaluation criteria for the necessity of the items use a 3 points evaluation scale:

1. Necessary
2. Neither necessary nor unnecessary
3. Unnecessary

The evaluation criteria for scale items use a 3 points evaluation scale:

1. Appropriate
2. Neither appropriate nor inappropriate
3. Inappropriate

The evaluation document is presented in Appendix G. According to the instructions, the experts assessed and evaluated the items one by one, and added comments or suggestion regarding the items and the scales. When the evaluation finished, one to one interviews are organised to personally obtain comments from experts.

7.1.2 Participants

A total of 14 participants were recruited: 10 experts, 2 English academic proof-readers, and 2 Arabic qualified academic translators. For the purpose of the current study, experts were identified based on their current research, previous publications and interest in the related fields HCI, education and educational technology, with more than five years of experience. It is worth mentioning that the number of judges for content validity has not been clearly specified in the research literature. However, the suggested number of judges can range between a minimum of three to ten experts (Lynn, 1986).

7.1.3 Procedure

The procedures included three specific periods: pre, during and after study.

Pre-Study

- **First Stage**

Before starting the content validity, an ethical approval was obtained from the University of Southampton Ethics Committee. Ethics approval was granted under Reference Number 30975 on 29th November, 2017.

- **Second Stage**

Initial piloting of the instrument's items (English version) was undertaken by asking two proof-readers to review the items and provide feedback, which provides an initial insight into the clarity of instrument items.

- **Third Stage**

All items were translated by a qualified academic translator from English to Arabic, which were then reviewed by 2 colleagues who are proficient Arabic-English bilinguals. Initial checking was significant, as all items were translated into the teacher's native language (Arabic). Following this, the copy of the checklist (Arabic version) was sent to them and they were asked to complete it while thinking aloud. Each of them reviewed it separately in my presence, in order to be able to ask about any confusion or misunderstanding. They were also asked to comment on the checklist's format and layout. Even though most of the items were clear and easy to understand, valuable comments were provided to modify some items that were somewhat ambiguous or lengthy and complex. Based on their recommendations and comments, a few items were rephrased, and some phrases were omitted, which made the items shorter and easier to

understand. Moreover, more details were added to clarify the example used in explaining some of the items in the checklist.

- **Final Stage**

When all previous stages were finished, an invitation email was sent to the prospective participants. If they agreed to take a place in the study, an email provided information of the study and a consent form was sent to the participants. The participant needed to sign the consent form and send it back to the researcher before commencing the study. Once the researcher received the consent form, detailed step-by-step procedures, an evaluation sheet, and SET checklist were provided in an email that the participant should follow in order to complete the task.

During-Study

The participants were given the information sheet (attached in the email). They were assured that no personal information would be used in the analysis or publications. However, their emails and consent information would be kept as confidential. All data would be coded and no link would be visible between their information and their response sheet. They also explained that the participants' involvement was voluntary, and that they may terminate their involvement at any time by requesting to withdraw from the activities. They were subsequently informed that they could withdraw and no further action would be required.

The evaluation was divided into two steps: self-*administered evaluation and then face-to -face sessions.* During the self-administered evaluation, when the participants were ready, they would be provided with the evaluation sheets where they could answer it depending on their availability and at their convenience. Once completed, the participant would inform the researcher, and subsequently a session would be organised to discuss the instrument and obtain all the comments from him/her. The participant could submit the evaluation document either in-person or by email to the researcher. In the one-to -one sessions, a time, date, and location were set with the expert to discuss their opinion about the instrument; the expert came to the location as agreed. The researcher made sure that the evaluation documents were present. The discussion started once all the documents were ready and then all comments were noted.

After-Study

When the participants completed the study and sent back the evaluation document, they were thanked by the researcher; no further contact was made to the participants regarding the study following this.

7.1.4 Results of Content Validity

Responses from all experts were gathered for each of the items; all items indicating "necessity" by the experts were calculated. A statistically significant level for each component was estimated based on the content validity ratio (CVR). This CVR is a quantitative approach to content validity, as introduced by Lawshe (1975), where the CVR is calculated as follows;

$$CVR = (n_e - (N/2))/ N/2,$$

Equation 7-1

Where n_e is the number of experts that agree with the particular item's necessity and N is the total number of experts in the study. An item that has CVR more than 0.5 is considered to be statistically significant at 0.05, and items with CVR lower than 0.5 are considered to not be statistically significant (Ayre & Scally, 2014; Lawshe, 1975). Hence, items that are not significant are eliminated (the list of all components with the CVR values of each item is presented in Table 7-1). The results show that from the 62 items of SETcl, only 49 significant items were considered as necessary by the experts for inclusion in the instrument. The average CVR range between 0.91 (highest) to 0.5 (lowest), at a 0.05 significant level. This average CVR indicates that the components in SETcl have an adequate content validity, which means that the items in SETcl reflected the subject being measured.

From the assessment, the experts also provided a number of suggestions. These suggestions were mostly in relation to the use of words (e.g. SOP6, ACC2); the clarity of the sentence (e.g. OCA1, OCA3); and adding examples for the item (e.g. OCA1, GCC5). Moreover, the suggestions were to ensure that the meaning of the items can be delivered as it should be. The response items (5 – Strongly Agree to 1 – Strongly Disagree) were considered as appropriate. The instrument items based on the result of the content validity ratio are presented in Appendix H. The items that are highlighted in yellow are to clarify the items after the participants' suggestions, while the items that are highlighted in red were deleted based on the results of the content validity ratio. The SET checklist in both the Arabic and English form after content validity is shown in Appendix I.

Table 7-1: Content Validity Results

Components	Number of Items	Significant Items	CVR item 1	CVR item 2	CVR item 3	CVR item 4	CVR item 5	CVR item 6	CVR item 7	CVR item 8	CVR item 9	Average CVR
OCA	*9*	*8*	*1*	*0.8*	*1*	*0.8*	*1*	*0.8*	*0.6*	*0.8*	*0.4*	*0.80*
ECR	*6*	*4*	*0.4*	*0.8*	*0.2*	*0.8*	*0.8*	*0.6*	-	-	-	*0.60*
GCC	*6*	*3*	*0.0*	*1*	*0.8*	*0.0*	*1*	*0.2*	-	-	-	*0.50*
OCS	*5*	*3*	*0.4*	*0.8*	*0.6*	*0.8*	*0.4*	-	-	-	-	*0.60*
TER	*8*	*6*	*0.2*	*0.8*	*0.8*	*0.4*	*1*	*1*	*1*	*0.8*	-	*0.75*
CMS	*6*	*5*	*0.8*	*0.8*	*0.8*	*0.8*	*0.4*	*0.8*	-	-	-	*0.73*
SOP	*6*	*4*	*1*	*0.8*	*0.4*	*0.8*	*0.0*	*0.6*	-	-	-	*0.60*
UAU	*7*	*7*	*1*	*1*	*1*	*1*	*0.8*	*0.6*	*0.6*	-	-	*0.85*
UCH	*9*	*9*	*O.6*	*1*	*1*	*0.8*	*1*	*1*	*1*	*1*	*0.8*	*0.91*
Total	*62*	*49*										

7.2 Validating the Checklist by Using an Experiment

After conducting the content validity in Step 1, the validation experiment is continued as a final step in order to validate the modified version of the SET checklist. The experiment will focus on the construct validity to ensure that the SET checklist measures the underlying concept. Therefore, the experiment validation examines factor analysis, internal consistency of the items, the component, and the instrument as a whole, as well as the correlation for inter-items and inter-component.

7.2.1 Methods for Designing the Experiment

The experimental research method was used in the current study. Experiments are designed and conducted to validate the instrument. The experiment's design in this study followed a within-subject approach and cross-over design. These two methods are explained in detail below:

- **Within-Subject Design vs Between-Subject Design**

Creswell (2009) demonstrates that the 'Within-subject design' and 'between-subject design' are empirical evaluations that are designed for experimental utilisation that help to compare in

excess of two treated conditions. The within-subject design is a study where individuals (i.e. subjects) are tested conclusively within an experiment's experiences, where all conditions under treatment are measured; whereas, a between-subject design is when only one of the conditions is tested. Both of these designs intend to compare in excess of two conditions (Cowell & Stanney, 2005; Fu, Su, & Yu, 2009; Mekler, Brühlmann, Opwis, & Tuch, 2013); or in excess of two different subjects (Li, Forlizzi, Dey, & Kiesler, 2007; Murano & Holt, 2011). Meanwhile, in certain cases, this relates to multiple outcomes for each subject, as it is not in relation to comparisons across conditions (Dahl & Kraus, 2015; Macvean & Riedl, 2011); while it is also to achieve consistency levels of individual preferences across different conditions (Blanco, Engelmann, & Normann, 2011).

The set research question directs which design is implemented. The experiment that is conducted during the current research aims to determine the consistency levels of individual preferences, as well as present a variety of outcomes from each individual subject. Therefore, the within-subject design was selected for the research, where each subject has control over all the specific conditions; thus, the effect of individual contrasts is reduced. However, Dahl and Kraus, (2015) emphasise the potential for carry-over effects when conducting a within-subject design, which occurs when the initial test influences the process of conducting the following test, where each participant advances his/herself. Correspondingly, the tasks become easier, as the individual has learned from the initial test and gained hints for the second, which develops a learning bias within the study. Consequently, a crossover design method is suggested in order to avoid bias, as explained next.

- **Crossover Design**

A crossover design helps to mitigate the carry-over issues and to balance the effects of learning when undertaking a specific task (Dahl & Kraus, 2015; Kumar, 2011). Each participant, as Kumar (2011) states, is tested under all conditions in a crossover design, although the testing order is interspersed between the different conditions. For instance, there are two participants (P1 and P2) who are tested under conditions *A* and *B*, where P1 is tested under condition *A* in the first round and P2 under condition *B*. Subsequently, the P1 and P2 are swapped around for the second round between conditions *A* and *B.* The current study utilised the crossover design in order to conduct a more valid experiment.

7.2.2 Experimental Process

The within-subject design applied a crossover design as a method to obtain responses from participants. The reason for applying this method is to minimise the potential problems when

applying the within-subject design. The crossover design allocates each participant to a sequence of interventions. A simple randomised cross- over design is an 'AB/BA' design in which participants are randomised initially to intervention A or intervention B, and then 'cross over' to intervention B or intervention A. In addition, two experimental prototypes were designed to present the items in the instrument. The prototypes are designed to combine between new functions and already implemented functions on available tools. The process of choosing appropriate tools for designing experiment prototypes is described in Section 7.2.3.1.

In detail, a crossover design required participants to test the tools by undertaking the two interventions interchangeably; 50 teachers were divided into two groups (25 in each group). The statistical rational for choosing this number of participants was explained in Section 7.2.5. The experiments were conducted with teachers for whom Arabic is their mother tongue and can understand English at intermediate level. The first participant completed the tasks that related to intervention A (prototype one), and then the second participant undertook the tasks for intervention B (prototype two). Once finished, both groups would answer the online survey and then submit their responses. After that, the participants swapped the interventions, completed tasks and provided responses again. Figure 7.2 shows the methodology of the crossover design that was used.

The final version of SETcl is transformed into an online survey using the *SmartSurvey* tools. The survey can be accessed at http://www.smartsurvey.co.uk/s/L7TRS/; the survey was available until 31st December, 2018. Appendix I represents the final version of the survey after content validity.

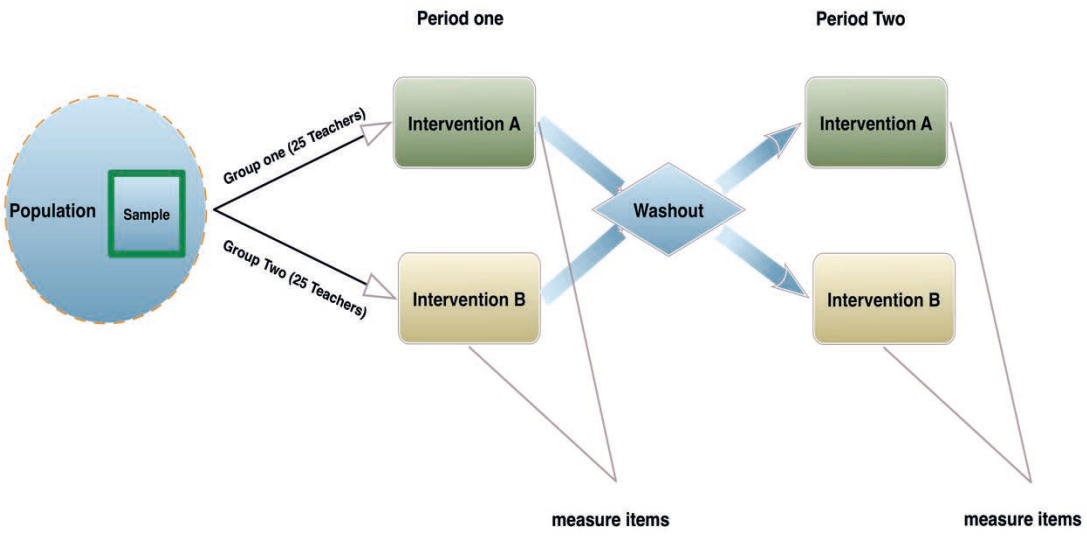


Figure 7.2: The methodology of the cross-over design that was used

7.2.3 Preparing the Experiment Material

This section presents the process of choosing experimental tools and participants' materials that were used in the validation.

7.2.3.1 Selecting Experimental Tools

All the components and items of the SETcl instrument are generally based on the assessment web-based tool, except one component that specifically represents the Arabic language and Saudi Arabian culture. 42 items are considered general items in assessing web-based tools (for both English and Arabic tools) and 7 items are related to Arabic web-based tools. Table 7.2 below represents the summary of general and specific items in the SETcl instrument.

Despite all the attempts to find Arabic web story-writing tools that represented all items, the researcher's effort was unproductive. Therefore, two prototypes have been designed to validate the instrument's items. Some items were already represented on available tools while others were not implemented yet. Therefore, the prototypes were designed to present both items' functions that are not present in available tools, together with those that are already implemented in available tools. The available tools have been chosen based on the functionalities of each tool that represent some items in the instrument. Every attempt was made to ensure that the two prototypes represented the subject matter of the items clearly. Table 7-3 shows the descriptions of tools that represented in both experiments and items that represented in each tools.

Table 7-2: The Summary of General and Specific items in the SETcl instrument before starting the experiment

SETcl instrument for assessing web-based story-writing tools			
	General Items (Related to English and Arabic Tools)		**Specific Items (Related to Arabic tool)**
	• Obtaining Children's Attention (OCA), eight items • Establishing Children's Relevance (ECR), four items • Gaining Children's Confidence (GCC), three items • Obtaining Children's Satisfaction (OCS), three items • Teacher's Role (TER), six items • Class Management System (CMS), five items • Social Presence (SOP), four items • Usability for Children (UCH), nine items		• Usability for Arab Users (UAU), seven items
	No. Items	**42 items**	**7 items**

Two prototypes (experiments) were designed to help test the instrument's items and guide the participants when examining the tools. In prototype one, one English story-writing tool (storybird) and one Arabic vocalisation system (mishkal) were allocated, which represented 38 general items and three Arabic related items based on the activities' design of the experiment.

- Obtaining Children's Attention (OCA), six items
- Establishing children's Relevance (ECR), four items
- Gaining Children's Confidence (GCC), three items
- Obtaining Children's Satisfaction (OCS), three items
- Teacher's Role (TER), six items
- Class Management System (CMS), five items
- Social Presence (SOP), four items
- Usability for Arab Users (UAU), three items
- Usability for Children (UCH), seven items

In prototype 2, two Arabic language-learning tools (alefbata, anasworld) were allocated, which represented four Arabic related items, as well as four general items.

- Obtaining Children's Attention (OCA), two items
- Usability for Arab Users (UAU), four items
- Usability for Children (UCH), five items

However, three items from the component of Usability for children (UCH3, UCH4, UCH7) can be available in both experimental prototypes. Table 7-3 represents the brief description of tools that were used in designing the prototypes and items' codes that were represented in both experiment prototypes.

Each prototype has a set of tasks, and each task has been assigned to represent some items in the instrument. Participants need to follow the instructions in order to undertake each task in the prototypes. Appendix J.1 shows the items' availability in the tools, along with the task ID in the designed prototypes**.**

Table 7-3 The descriptions of tools that were used in experiments1 and experiment 2 and items represented in each tools

	Tools name	Brief description	Item code	Summary of Components and items no
Experiment 1	Storybird	Language learning activities that could be used in the classroom for young learners as a creative writing opportunity to create storybooks using illustrations of Storybird in the English language.	OCA1, OCA2, OCA3, OCA4, OCA5, OCA6, ECR2, ECR4, ECR5, ECR6, GCC2, GCC3, GCC5, OCS2, OCS3, OCS4, TER2, TER3, TER5, TER6, TER7, TER8, CMS1, CMS2, CMS3, CMS4, CMS6, SOP1, SOP2, SOP4, SOP6, UCH2, UCH3, UCH4, UCH5 UCH7, UCH8, UCH9	• Obtaining Children's Attention (OCA), six items • Establishing Children's Relevance (ECR), four items • Gaining Children's Confidence (GCC), three items • Obtaining Children's Satisfaction (OCS), three items • Teacher's Role (TER), six items • Class Management System (CMS), five items • Social Presence (SOP), four items • Usability for Arab Users (UAU), three items • Usability for Children (UCH), seven items
	mishkal	Automatic system of vocalisation of Arabic text	UAU1, UAU2, UAU3	
No. Items			40 items (Note: UCH3, UCH4, UCH7 can be available in both experiments)	
Experiment 2	**Tools name**	**Brief description**	**Item code**	
	alefbata	A literacy web-based tool that available currently on the market and written by Arab developers. It includes activities to improve writing and reading for Arab children from 4-7 years old, which also involves interactive games and stories.	OCA7, OCA8, UAU4, UAU5, UCH1, UCH3, UCH4, UCH7	• Obtaining Children's Attention (OCA), two items • Usability for Arab Users (UAU), four • Usability for Children (UCH), five items
	anasworld	An Arabic tool that provides multimedia videos to develop listening and reading skills, which specifically focused on the Islamic religion. This website available currently on the market and written by Arab developers.	UAU4, UAU6, UAU7, UCH3, UCH4, UCH6, UCH7	
No. Items			11 items (Note: UCH3, UCH4, UCH7 can be available in both experiments)	

7.2.3.2 Participants' Materials

The participants were provided with four types of materials

- A consent form to sign and return to the researcher prior to starting the experiment.
- The information sheet to read, which explains the purpose of the study, the procedure of the experiment, benefits and risks of the experiments (Appendix J.2).
- List of activities within the two prototypes to help and guide participants in assessing chosen tools (Appendix J.3).
- Accessing the SETcl instrument, which transformed into an online SmartSurvey in order to gain participants' responses. A set of items allocated to the chosen tools that were examined in each experiment. At the end of the survey, a set of three questions was presented that participants had to answer; these questions were related to the clarity of the items and the use of the instrument (Appendix I).

7.2.4 The Experiment's Pre-Testing

An experiment's pre-test is an initial study that pre-tests a certain instrument or questionnaire prior to its utilisation within a study (Creswell, 2009); this is undertaken by administering the developed items to a potential sample. Moreover, the experiment's pre-test develops a test in order to determine early issues and to anticipate prospective successful outcomes (Saunders, Lewis, & Thornhill, 2009). The pre-test also develops constructs or particular questions that can be refined when required. In addition, as (Creswell, 2009) shows, the initial data analysis enables the collected data from the test to help answer the research questions. Consequently, the current study has employed a pre-test in order to avoid potential problems. A pre-test of the experiment is a necessary approach to gather insight and suggestions from experts and make sure that all the items in the instrument and the design of experiment activities are clear and understandable to the participants prior to the real experiment.

Due to the lack of Arabic web story-writing tools, an English tool was used instead to assess the instrument; the current study required the participants to know both Arabic and English languages. The pilot study was conducted with five Arabic experts whose English is their second language, in order to check the two experiments. Specifically, two experts were Phd students from the education school at the University of Southampton, whose research specialised in educational technology. Two experts were from the same education school, whose research specialised in language learning and one Arabic teacher at public primary school in Saudi Arabia who was awarded a prize for using storytelling activities to learn Arabic. All experts were female

ranging from 25 to 55 years old. The experts were chosen based on their experience in learning language or technologies for motivating children and their interest in the set study.

Each expert was invited to conduct the same procedures in the real experiment, which required examining the selected tools by using the list of activities. Once they had finished, the online survey was given to assess tools. When the survey was completed, the researcher asked the participants regarding their opinions and suggestions. After collecting the feedback, more details were subsequently added to the instructions of the activities and the prototypes to help guide the participants in assessing web based story-writing tools.

7.2.5 Participants

The experiment was conducted with 50 participants. This number was chosen based on studies in conducting an exploratory factor analysis. According to de Winter, Dodou and Wieringa (2009), for any research, the minimum acceptable number of participant to conduct an exploratory factor analysis is 50. In Hubbard (2014), the "rule of five" explains that the random answers obtained from five people will have a 93.75% chance that the median of population will be between the highest and lowest values of the five samples. The number of samples is also determined by ratio between observations (*N*) and items (*i*); *N; i*, for example: 5:1, 10; 1, 20; 1. Separately, Hair *et al.*, (2009) suggest a minimum ratio of five observations per item to perform a factor analysis. However, if one considers Hubbard's and Hair's suggestions to calculate the minimum sample size, the sample size would be 45 participants (five samples for 9 components) and this number is fewer than the acceptable number of participants to conduct an exploratory factor analysis. Therefore, it was necessary to obtain at least 50 participants for the current experiment. The experiments were conducted with 50 teachers in primary schools within Saudi Arabia. They were all Arabic native speakers and English as their second language. The participants' ages ranged from 30 to 50 years with experience in teaching primary school students for more than three years. All participants had graduated from the faculty of education in universities in any area of educational technology, Arabic or English languages.

7.2.6 Procedure

The procedure of conducting the experiment involved the three stages of pre-, during- and post-the experiment, which commenced with recruiting the participants until the participants completed the online survey. The details of each step are as follows:

Pre-Experiment

One-week prior to the experiment, an invitation email was sent to the prospective participants. If they were willing to participate, they were required to reply to the email in order to identify a convenient time and date to participate.

During- Experiment

When the participants came to the agreed place and at the agreed time, the participant would be thanked for agreeing to be involved in the experiment. They would be provided with a copy of the information sheet to read and understand carefully. They could then ask any questions related to the study; when they understood and were satisfied with the information, they would sign the consent form.

When the experiment started:

- Firstly, the researcher provided the participant with an overview of the detailed tasks that would be required during the experiment.
- Secondly, the participants were given the relevant material relating to the experiment (list of activities and online survey).
- Thirdly, the participants were given a laptop, which had the two prototypes to use for the examination by performing each of the relevant activities on the list. The participant could examine the tools for as much time as required to complete the tasks.
- Fourthly, when the participant finished assessing the tools and completing all the tasks, the researcher provided them with the online survey by using iPad and asked them to complete it. They would spend a maximum of 45 minutes to answer the questions. At the end of the survey, the participants would be asked a set of three questions relating to the clarity of the items and the use of the instrument.
    - Question one: Did you find the items of the instrument easy to understand? If not, what was difficult?
    - Question two: Do you have any comments regarding the instrument's items?
    - Question three: How easy did you find the use of the instrument to assess and identify appropriate web-based story-writing tools that motivate children?

Question one was created in order to check whether the items were easy to understand; if participants found certain items difficult to understand, it might mean that their responses to these items were due to a lack of understanding. Comments regarding the items in the dimension used in each experiment were collected from participants through Questions two. Question three was created to investigate whether the items of the instrument were easy to utilise. This question was accompanied by a five–point Likert Scale and the endpoints of the scale 1 and 5 were "Difficult" and "Easy", respectively.

Finally, the participant would be thanked for participating in the experiment.

Post-Experiment

Once the participant completed the study, he/she could leave the venue and no further contact regarding the study would be made.

7.2.7 The Validity Results and Analysis

This section presents the analysis and results from the two experiments to confirm the validity of the SET checklist instruments. Initially, data screening for collected data was obtained and is discussed in Section 7.2.7.1. Next, for construct validity, the results were analysed for exploratory factor analysis (EFA), reliability, and correlation. The results were statistically analysed by using IBM SPSS version 23. Results are shown in Section 7.2.7.2.

7.2.7.1 Data Screening

Prior to starting the data analysis, the data was screened from each experiment for repeated items and missing data. In experiment one, a total of eleven items were repeated, which related to experiment two (OCA7, OCA8, UCH3, UCH4, UCH7, UCH8, UCH6, UAU4, UAU5, UAU6, UAU7). Moreover, a total of twelve items were repeated in experiment two and related to experiment one (OCA1, OCA2, OCA3, OCA4, OCA5, OCA6, UAU1, UAU2, UAU3, UCH1, UCH2, UCH5). After screening, no items were repeated and no data was missing.

7.2.7.2 Construct Validity

The construct validity was determined in testing all the components of the instrument to confirm whether the scales in the SET checklist were as expected. The following several tests were employed to validate the construct of the instrument:

1. Reliability test conducted Cronbach's α to confirm the internal consistency of the measuring items in a component;

2. Exploratory factor analysis (Principle component analysis (PCA) with varimax rotation used to examine the relationships and pattern among items in the SET checklist);
3. Correlation analysis used the Pearson's correlation coefficient (r) to measure the strength of a relationship between two or more factors, components, and items in the SET checklist.

7.2.7.2.1 Reliability Analysis for the SET checklist

The reliability analysis was performed to confirm the internal consistency of the measuring items in a component. Each component was calculated by using the Cronbach's alpha, which is presented in Table 7.4. The values of the Cronbach's alpha were varied between the lowest (.519) for the Obtaining Children's Attention (OCA) component and the highest value (.881) for the Teacher's Role (TER). Overall, all nine components had a good reliability with Cronbach's alpha equal to .729. Therefore, all components had a good internal consistency.

Table 7-4: The Reliability Results for SET Checklist

Factor	Requirements	No of items	Cronbach's α
Sustainability Elements	Obtaining Children's Attention (OCA)	7	.519
	Establishing Children's Relevance(ECR)	4	.667
	Gaining Children's Confidence (GCC)	3	.748
	Obtaining Children's Satisfaction (OCS)	3	.824
Educational Elements	Teacher's Role (TER)	6	.881
	Class Management System (CMS)	5	.711
	Social Presence (SOP)	4	.819
Technical Elements	Usability for Arab Users (UAU)	7	.610
	Usability for Children (UCH)	9	.786
Total	**9 Requirements**	49 items	.729

7.2.7.2.2 Exploratory Factor Analysis

The findings were analysed for exploratory factor analysis. A principal component analysis (PCA) with varimax rotation was performed as a method for conducting the exploratory factor analysis. The following analyses' criteria was followed, as recommended by (Hair et al., 2009):

1. The sampling adequacy was tested by Kaiser-Meyer-Olkin, which ranged between 0 and 1. The KMO value must exceed 0.5 to perform factor analysis. A KMO value of 0.6 is suggested as a minimum value to achieve a good factor analysis (Tabachnick & Fidell, 2007) .

2. The sphericity was tested by Bartlett's test. A statistically significant Barlett's test of sphericity must be less than .05, which indicates the sufficient correlation among items in order to proceed.
3. Communalities of each item should be more than .50 for most variables.
4. Factors with eigenvalues must be greater than 1.0.
5. Percentages of variances explained; usually 60% or higher.
6. The factor loadings of ±.30 to ±.40 are minimally acceptable, while values greater than ±.50 are generally considered necessary for practical significance with cross-loaded not higher than .30

I. Factor Analysis of Sustainable Elements

The first factor analysis conducted on 18 items of sustainable elements produced four components with eigenvalues above one. The results showed the KMO value was measured to be .64. The result indicated a strong significance of the Barlett test of sphericity (sig<0.05).

The communalities of 18 items ranged from .26 (OCA5) to .78 (ECR5). Three items achieved communalities below .50: OCA5 (.26), OCA6 (.44), ECR6 (.45). Two items have a factor loading less than 0.5 (OCA5= .409) and (ECR6 = .411). However, the communalities and factor loading for three items remained low; removing these items would not affect the content validity and the component being measured. Thus, three items were deleted.

Two items had a factor loading less than 0.5 (OCA5= .409) and (ECR6 = .411). Factor loading for those two items was considered acceptable based on Hair et al.'s criteria. One item was loaded in two different components (GCC5= .550): in component 3 (Gaining Children's Confidence (GCC)) and (GCC5=.509) in component 4 (Obtaining children' Satisfaction (OCS)). Indeed, cross loading factor means the item's meaning could be unclear or confused (Hair et al., 2009). The loading in component 3 was more than component 4. In this case, the decision to remove or retain the item referred to the process of development in the checklist within Chapter Six and the content validity in Section 7.1. By going through the process, deleting this item would affect the content validity or concept being measured; therefore, this item was retained. The results for the first run are shown in Table 7.5.

The second run of the factor analysis on 16 items was also extracted into four components. The KMO value was .65 and the Baretlet test of sphericity was significant, <.05. Meanwhile, the total variance explained is equal to 67.21%. The communalities ranged from (OCA2= .48) to (ECR4= .813). No items had factor loadings less than .5 and one item (OCS4) had cross-loaded in component 2 equal to .40 (Obtaining children' Relevance) and component 4 equal to .625

(Obtaining Children's Satisfaction). However, the cross-loaded value was very low, and thus, item OCS4 was retained. The results from the second run of factor analysis demonstrate that they are practically acceptable and statistically significant; details of the results are presented in Appendix K.1.

Table 7-5: Factor Analysis of Sustainability Elements (First run)

Items		Communalities	Component 1	2	3	4
Component 1: Obtaining Children's Attention (OCA)						
OCA1	The tool has visual representations, such as pictures before starting the storytelling activity	.579	.732			
OCA2	The tool has different types of examples	.496	.517			
OCA3	The tool has brainstorming and organising techniques, such as storyboarding and story mapping before starting the storytelling activity	.713	.689			
OCA4	The tool has various formats of storytelling, such as long form (more text, fewer images) and short form (more images, less text)	.683	.778			
OCA5	The tool allows the addition of various topics	.258	.409			
OCA6	The tool allows the addition of concrete vocabularies to prompt students to write	.441	.551			
OCA7	The tool allows the use of interactive materials or multimedia	.669	.776			
OCA8	The tool involves a brief gaming activity	.531	.701			
Component 2: Establishing Children's Relevance (ECR)						
ECR2	The tool provides children with the choice to write a story in any way	.645		.753		
ECR4	The tool has activities suitable for the children's level	.738		.773		
ECR5	The tool has vocabularies that reflect the language of the children	.776		.851		
ECR6	The tool has visual cues and symbolic thought that reflect values, knowledge and beliefs of a group of children	.446		*.411*		
Component 3: Gaining Children's Confidence (GCC)						
GCC2	The tool includes challenging tasks	.575			.673	
GCC3	The tool includes frequent and varied activities	.564			.554	
GCC5	The tool provides children with a sense of independence, such as within self-evaluation and easy access without guidance	.684			.550	.509
Component 4: Obtaining Children' Satisfaction (OCS)						
OCS2	The tool gives praise for successful progress or accomplishment	.672				.792
OCS3	The tool varies the schedule of reinforcements	.744				.837
OCS4	The tool provides motivating feedback (praise) immediately following task performance	.684				.653
Eigenvalue			5.543	2.358	1.636	1.362
% of Variance			30.79	13.10	9.08	7.56
Total Variance Explained		60.53%				
KMO		.639				

Barlett's Test of Sphericity	450.348
Significant	.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 5 iterations.

II. Factor Analysis of Educational Elements

The initial factor analysis was carried out on 15 items, which produced three components with eigenvalues above one. The results show that the KMO value was .771, and that the Barlett test of sphericity is significant <0.05. The total variance explained was equal to 67.23%. All items had communalities above .5 that ranged from (SOP4=.503) to (TER6=.844). All the items also achieved factor loading more than .5.

However, four items were removed: TER7, TER8, CMS2 and SOP1, as they were cross-loaded and deleting one of them would not affect the validity on the content being measured. TER7 and TER8 were deleted because they were cross-loaded in component one, Teacher's Role (TER) and component three, Social Presence (SOP). Item CMS2 was removed, as it was also cross-loaded in component one, Teacher's Role (TER) and component two, Class Management System (CMS). SOP1 was also deleted with the same previous reason, as the cross-loaded on component two, Class Management System (CMS) and component three, Social Presence (SOP). Table 7.6 below presents the details of the results for the first run of the factor analysis.

After removing four items, the factor analysis was conducted again with 11 items and produced three components. The results show that the KMO value is .687, and the Barlett test of sphericity is significant, <0.05. The total variance explained is equals to 66.236%. All items had communalities above .5 ranged from (TER6=.893) to (TER3=.510). No items had factor loadings at less than .45, and only two items, SOP2 and SOP4, were cross-loaded in component two, the Class Management System (CMS) and component three, Social presence (SOP).

However, if the two items deleted the KMO value, the variance explained would be decreased. Moreover, those two items were important in measuring the component of social presence and deleting them may have affected the content being measured; thus, items were retained. Based on the second run of factor analysis, the results demonstrate that they are practically acceptable and statistically significant. Details of the results of the second run are presented in Appendix K.2. The components for the educational elements are labelled as the same as the component in the SET checklist.

Table 7-6 Factor Analysis of Educational Elements

			Component		
Items		Communalities	1	2	3
Component 1: Teacher's Role (TER)					
TER2	The tool provides teachers with the opportunities to give feedback and comment on children's work	.583	.727		
TER3	The tool provides teachers opportunities to reward students' work	.604	.573		
TER5	The tool allows teachers to design storytelling activities	.700	.775		
TER6	The tool allows teachers to modify storytelling activities	.844	.802		
TER7	The tool allows teachers to communicate electronically with colleagues, parents and children	.765	.607		.592
TER8	The tool allows teachers to share children's work with their parents	.832	.499		.651
Component 2: Class Management System (CMS)					
CMS1	The tool has a password-protected system to log in with different levels of authorities and functions	.699		.807	
CMS2	The tool has a learning management system	.760	.636	.507	
CMS3	The tool enables the creation of teams to accomplish a task	.574	.666		
CMS4	The tool allows for developing smaller learning communities	.841	.780		
CMS6	The tool provides criteria for evaluation practices	.532			*.563*
Component 3: Social Presence (SOP)					
SOP1	The tool allows parents/relatives to recognise and reward their children's work	.727		.550	.530
SOP2	The tool enables child to safely use various communication and discussion tools with colleagues, parents, and teachers	.600			.524
SOP4	The tool has social rewards, such as "like" buttons and other incentives	.733			.687
SOP6	The tool helps the children to collaborate with colleagues, teachers and parents	.504			.618
Eigenvalue			7.740	1.230	1.117
% of Variance			51.59	8.199	7.446
Total Variance Explained		67.235%			
KMO		.771			
Barlett's Test of Sphericity		569.286			
Significant		.000			

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 5 iterations.

III. Factor Analysis of Technical Elements

The initial run of factor analysis was conducted on 16 items, which was extracted into two components. The KMO value is .587 and the Bartlett test of sphericity is significant, <0.05. The total variance explained is equal to 45.7%. The communalities ranged from (UAU7=.065) to (UAU1=.725), with seven items possessing communalities lower than .50: UAU4 (.338), UAU5 (.200), UAU6 (.130), UAU7 (.065), UCH1 (.387), UCH6 (.231) and UCH9 (.267). Six items had factor loading less than .5 and no cross-loaded value: UAU5 (.440), UAU6 (.343), UAU7 (.125), UCH1 (.176), UCH6 (.380) and UCH9 (.395); details of the results are shown in Table 7.7. Seven items were removed, as the communalities and the factor-loaded values were relatively below. Therefore, deleting these items would not affect the content being measured.

After removing the items, factor analysis was run again on 9 items, which was also produced into two components. The KMO value is .756 and the Bartlett test of sphericity is significant <0.05. The total variance explained is equal to 69.69%. Moreover, all items achieved communalities above .50, ranged from (UCH2=.557) to (UAU1=.948). No items had factor loading less than .5 and no cross-loaded value between components. The results from the second run of factor analysis show that the KMO value and the total variance explained were improved. Moreover, the results are practically accepted and statistically significant. The items were grouped and conceptualised under the same label of component in the SET checklist instrument; details of the second run of factor analysis are shown in Appendix K.3.

7.2.7.2.3 **Correlation**

A Pearson‘s correlation coefficient was run to assess the strength of relationships between components and factors. General guidelines are provided by (Cohen, 1988a) as the following :

- .1 < | *r* | < .3 small / weak correlation
- .3 < | *r* | < .5 medium / moderate correlation
- | *r* | >.5 large / strong correlation

I. Correlation for the Sustainability Elements factor

The correlation results are shown in Table 7.8. The results illustrate that:

- There was a strong correlation between Gaining Children’s Confidence (GCC) and Obtaining Children’s Satisfaction (OCS) (r (4) = .615, p < .01.
- There was moderate correlation between Obtaining children’ Attention (OCA) and Gaining Children’s Confidence (GCC) (r (4) = .433, p < .01., as well as between Obtaining Children’s Attention (OCA) and Obtaining Children’ Satisfaction (OCS) (r (4) = .326, p < .05.

Establishing Children's Relevance (ECR) is moderately correlated with Obtaining Children' Satisfaction (OCS) (r (4) = .298, p < .05.

- A weak correlation exists between Establishing Children's Relevance (ECR) and Obtaining Children's Satisfaction (OCS) (r (4) = .298, p < .05.

Table 7-7 First Run of Factor Analysis for Technical Elements

Items		Communalities	Component 1	Component 2
Component 1: Usability for Arab Users (UAU)				
UAU1	The tool supports the direction of writing from right to left for text	.725	.851	
UAU2	The tool supports the direction of writing from right to left for numbers	.623	.788	
UAU3	The tool allows users to write with diacritical marks	.466	.680	
UAU4	The tool supports a right to left user interface	.338	.534	
UAU5	The tool provides the ability to change the language setting to gender-specific language	.200	.440	
UAU6	The tool uses understandable literal icons and directional images that reflect the purpose in Saudi culture	.130	.343	
UAU7	The tool has visual library that reflects Saudi culture, such as Saudi clothes, traditional food, and holy sites in Islam	.065	.125	
Component 2: Usability for Children (UCH)				
UCH1	The user interface takes into account gender-based differences to customise their preferences	.387		.176
UCH2	The tool uses video-based help	.525		.724
UCH3	The user interface uses funny, colourful, encouraging and entertaining content	.608		.779
UCH4	The design of the user interface is easy and simple to use	.708		.789
UCH5	The fonts (style, colour) in the tool are easy to customise	.695		.821
UCH6	The user interface uses animation and sound effects	.231		.380
UCH7	The user interface has a clear and consistent navigation	.716		.846
UCH8	The user interface uses clear understandable icons	.628		.781
UCH9	The tool enables users to customise the look of the personal avatar	.267		.395
Eigenvalue			4.560	2.752
% of Variance			28.50	17.20
Total Variance Explained		45.7%		
KMO		.587		
Barlett's Test of Sphericity		423.670		
Significant		.000		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 5 iterations.

Table 7-8 Correlation for the Sustainablity Elements

Components	*1*	*2*	*3*	*4*
1. Obtaining Children's Attention (OCA)	-	.109	.433**	.326*
2. Establishing Children's Relevance (ECR)		-	.328*	.298*
3. Gaining Children's Confidence (GCC)			-	.615**
4. Obtaining children's Satisfaction (OCS)				-

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

II. Correlation for the Educational Elements Factor

The component of the Teacher's Role (TER) is strongly correlated with Class Management System (CMS) (r (3) = .718, p < .01), as well as Social Presence (SOP) (r (3) = .641, p < .01). Class Management System (CMS) has a significantly strong correlation with Social Presence (SOP) (r (3) = .574, p < .01). Table 7.9 below shows the correlation for educational elements.

Table 7-9 Correlation for the Educational Elements

Components	*1*	*2*	*3*
1. Teacher's Role (TER)	-	.718**	.641**
2. Class Management System (CMS)		-	.574**
3. Social Presence (SOP)			-

**. Correlation is significant at the 0.01 level (2-tailed).

III. Correlation for the Technical Elements Factor

Based on the correlation results in Table 7.10 below , there is no statistical correlation between Usability for Arab Users (UAU) and Usability for Children (UCH) (*r* (2) = .147.

Table 7-10 Correlation for the Technical Elements

Components	*1*	*2*
4. Usability for Arab Users (UAU)	-	.147
5. Usability for Children (UCH)		-

IV. Overall Factor-to-Factor Correlation:

A sustainability factor has a strong correlation with the technical factor (r (3) = .528, p < .01) and a moderate correlation with the technical factor (r (3) = .381, p < .01). A moderate correlation exists also between the educational factor and the technical factor r (3) = .324, p < .01).

Table 7-11 Correlation Between Factors

Components	*1*	*2*	*3*
1. Sustainability Elements	-	.528**	.381**
2. Educational Elements		-	.324**
3. Technical Elements			-

**. Correlation is significant at the 0.01 level (2-tailed).

7.3 The Discussion of the SET Checklist

This section discussed the validation process for the SET checklist . both content and construct validity were discussed to validate the SETchecklist.

7.3.1 The Validation Process

The result of content validity, as shown previously in Table 7.1, presents the list of all components with the content validity ratio (CVR) for each item in the instrument. From the scale of 0 to 1, the CVR value for each item should be more than half to be included into the instrument. The minimum CVR for the evaluation of ten experts must be 0.62 or more to satisfy the five per cent level in one tailed test (Lawshe, 1975). This value was to determine that more than half of the experts agree with the suitability of the items and its necessity to the instrument (Ayre & Scally, 2014). A total of nine components and 62 items of the instrument were evaluated. From the CVR results, only 49 items were accepted; therefore, the SETcl instrument logically reflects the subject

being measured. In addition, the validation of the instrument was conducted with the validation experiment. The pre-test was conducted to collect the feedback and opinion from the teachers. More details were added to the instructions and the activities to guide participants in assessing tools (see Section 7.2.4). After the pre-test, the validation test was conducted to examine the construct validity of a new version of the instrument. Also, data obtained from the experiment were analysed for reliability, factor analysis and correlation (see Section 7.2.7).

7.3.2 Reliability Analysis

The internal consistency reliability test was conducted for the 9 components. According to Hair *et al.*, (2009) and Sekaran (2006), acceptable reliabilities is recommended to be over .60. In particular, the reliability analysis of overall SETcl components demonstrates strong evidence that the instrument is internally consistent. Among 9 components, 8 components have a Cronbach's alpha more than .60. In spite of the fact that the one component has a Cronbach's alpha below .60 (.519), they are still within the acceptable level of reliability, which is typically considered reasonable.

7.3.3 Factor Structure

Factor 1- Sustainable Elements

The factor produced four components and 18 items, which are consistent and match with the SET framework. Three items from the initial scale were removed (two items in component 1 (OCA5 and OCA6), and one item in component 2 (ECR6). This was because the items were not statistically supported in terms of low communality, factor loading below .45 and cross-loaded in other components. However, GCC5 from the first run and OCS4 from the second run, were not statistically supported, although they remained in the instrument.

Item GCC5, as the tool, provides children with a sense of independence, such as within self - evaluation and easy access without guidance, that are indicated to offer personal control that attribute success to personal effort. Using this technique helps to sustain a student's motivation and can be used to develop an instrument for measuring motivation (Keller, 1987a, 1987b). Self-evaluation for example, can help students reflect upon the status of their learning, as during the evaluation they have to make critical judgments of their own learning (Liu, Chen, Shih, Huang, & Liu, 2011). Item OCS4, as the tool, provides motivating feedback (praise) immediately following task performance. To receive immediate feedback and rewards when performing learning activities is one of the important strategies to sustain a student's motivation (Keller, 1987a; 1987b). Immediate feedback helps students to improve their strategies and gain a better chance

of success in the next attempt (Simões et al., 2012). According to the SET framework, these items are part of sustainable strategies that are measured in the SETcl instrument. However, as the items are theoretically important, they remained in the SETcl instrument. The final components in this factor consist of: Obtaining Children's Attention (OCA)*;* Establishing Children's Relevance (ECR)*;* Gaining Children's Confidence (GCC); and Obtaining Children's Satisfaction (OCS).

Factor 2 –Educational Elements

From 15 items, the factor extracted three components. All components corresponded to the SET framework. Four items from the initial run were removed, as they were statistically insignificant. However, two items, SOP2 and SOP4, were not statistically supported, although remained in the instrument. SOP2, the tool, enables a child to safely use various communication and discussion tools with colleagues, parents, and teachers; while, SOP4, the tool, has social rewards, such as "like" buttons and other incentives, are indicated for those who are motivated by social interaction. Users are actively encouraged to participate in the community by creating public user profiles, engaging in discussion by asking good questions, and providing helpful and relevant answers (Grant & Betts, 2013). Moreover, a way to engage learners in a collaborative production of knowledge is to promote social rewards that produce motivational boosts in educational settings (Simões et al., 2012). According to the SET framework, these items are part of the educational requirements being measured in the SETcl instrument. Furthermore, after four insignificant items were removed, 11 items in the educational factor were structured into three components: Teacher's Role (TER); Class Management System (CMS); and Social Presence (SOP), as conceptualised in the SETcl instrument.

Factor 3- Technical Elements

Two components were produced: Usability for Arab Users (UAU); and Usability for Children (UCH). Seven items were removed, due to the statistically insignificance. All of the nine items were relatively valid and they were matched with the conceptualised SETcl instrument.

7.3.4 Correlation between Factors

A correlation analysis was conducted in order to analyse the strength of the relationship between factor to factor, as well as components in each factor and the instrument as a whole. The results have shown that there is a significant relationship among the factors and among the components in each factor. As a whole the correlation result suggests a moderate and strong relationship, while there is a strong relationship between the sustainable elements and the educational

elements. There are also moderate relationships between technical elements and sustainable elements, as well as between technical elements and educational elements.

In addition, the correlation results between components in each factor were varied, which was potentially due to the availability or unavailability of functions in the tested tool. Even though none of the tools in the market take into the account children's motivation to write Arabic e-stories, the experiment applies certain tools that more or less could have some future function to motivate children in writing Arabic stories. Therefore, it was considered in order to measure the underlying concept in the SET framework. The correlation results between the factors are shown in Figure 7.3 below.

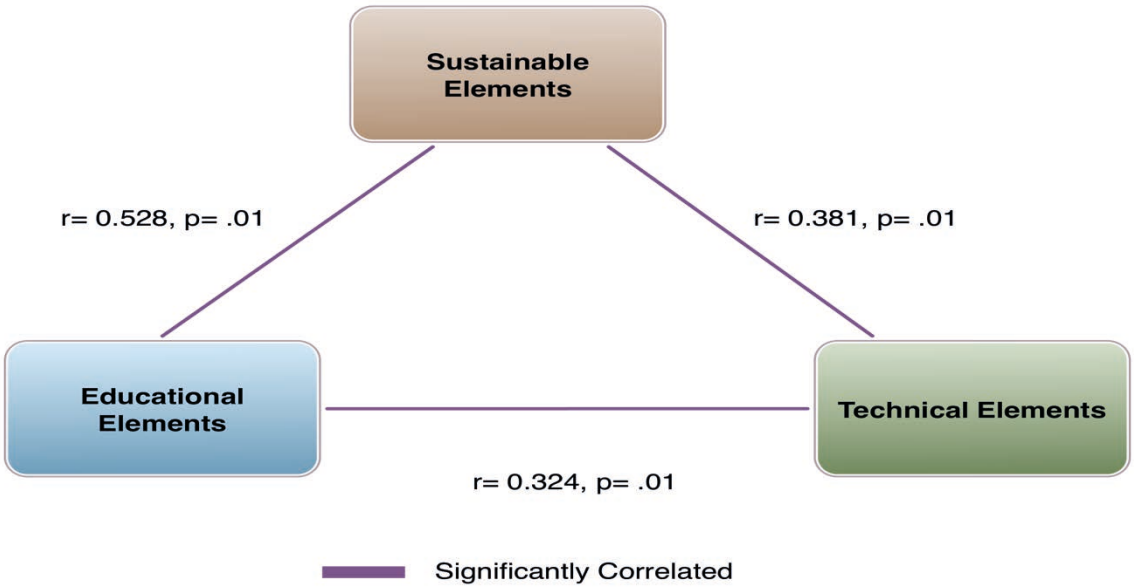


Figure 7.3: The Correlations between Factors

7.3.5 Participants' Feedback of Using the SET Checklist

The results of the three questions that were asked at the end of the experiment regarding the clarity of the items indicated that the SETcl instrument in general is easy to use and to understand. However, a minority of participants asked for more explanations to clarify certain points and that was avoided by asking the researcher. A minority asked for reformulating some items in the instrument. The majority of the participants (93%) agreed that the instrument is easy to use in assessing and identifying an appropriate web based story-writing tool that motivates child to write Arabic stories. Figure 7.4 are shown the results of participants' feedback.

Rate how easy did you find the use of the instrument to assess and identify an appropriate online storytelling tool that motivate child to write Arabic e-stories?قيّم مدى سهولة استخدام الاستبيان السابق في تقييم وتحديد الأداة المناسبة لتحفيز الاطفال لكتابة القصص الإلكترونية العربية؟

	1 Difficult	2	3	4	5 Easy	Response Total
-	2.1% (1)	4.2% (2)	4.2% (2)	52.1% (25)	37.5% (18)	48
					answered	48
					skipped	2

Matrix Charts

14.1. -			Response Percent	Response Total
1	1 Difficult		2.1%	1
2	2		4.2%	2
3	3		4.2%	2
4	4		52.1%	25
5	5 Easy		37.5%	18
Analysis	Mean: 4.19 Std. Deviation: 0.86 Satisfaction Rate: 79.69 Variance: 0.74 Std. Error: 0.12		answered	48

Figure 7.4: The Results of Participants' Feedback

7.3.6 Final SET Checklist

Overall, appropriate and robust considerations were performed in order to develop and validate the instrument. The outcome of the current research has illustrated that the SETcl instrument has provided an effective measure of the developed constructs. This means the items in each component statistically measure the same related underlined content. Additional and complimentary insights were gained in relation to motivational approaches that influence children based on teachers' experiences in schools, along with recommendations on good motivational practices. Consequently, the potential of the SETcl instrument to enable teachers to assess an appropriate Arabic web-based story-writing tool that motivates children has been established. The final version of the SETcl instrument resulted to have a total of 35 items that belonged to 9 components, within the three factors. The nine components were as follows:

- Two components: Obtaining Children's Attention (OCA) and Usability for Children (UCH) consist of six items.
- Two components: The Teacher's Role (TER) and Class Management System (CMS) consist of four items.
- Five components: Establishing Children's Relevance (ECR); Gaining Children's Confidence (GCC); Obtaining Children's Satisfaction (OCS); Social Presence (SOP), and Usability for Arab Users (UAU) are composed of three items.

The final 9 components and 35 items were established as the SETcl instrument. The summary for the process of development and validation of the SETcl instrument is illustrated in Figure 7.5 below and the final SETcl instrument is shown in Table 7.12.

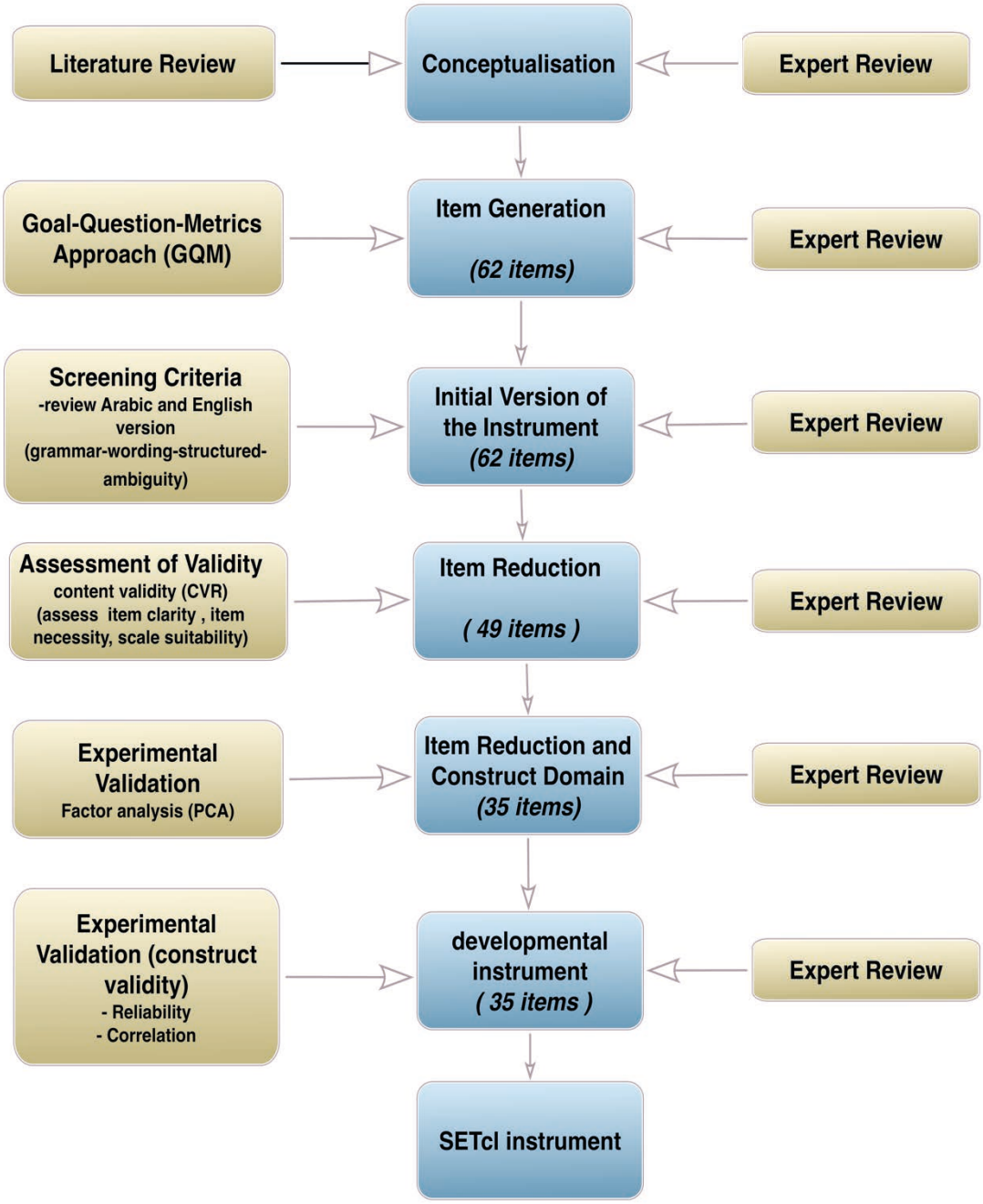


Figure 7.5: Summary for the Process of Development and Validation of the SET checklist

Table 7-12 The Final SET checklist

Factor	Component	Item code	Items
Sustainable Elements	Obtaining Children's Attention (OCA)	OCA1	The tool has visual representations, such as pictures before starting the storytelling activity
		OCA2	The tool has different types of examples
		OCA3	The tool has brainstorming and organising techniques, such as storyboarding and story mapping before starting the storytelling activity
		OCA4	The tool has various formats of storytelling, such as a long form (more text, fewer images) and a short form (more images, less text)
		OCA7	The tool enables the use of interactive materials or multimedia
		OCA8	The tool involves a brief gaming activity
	Establishing Children's Relevance (ECR)	ECR2	The tool provides children with the choice to write a story
		ECR4	The tool has activities suitable for the children's level
		ECR5	The tool has vocabularies that reflect the language of the children
	Gaining Children's Confidence (GCC)	GCC2	The tool includes challenging tasks
		GCC3	The tool has frequent and varied activities
		GCC5	The tool provides children with a sense of independence, such as within self-evaluation and easy access without guidance
	Obtaining Children's Satisfaction (OCS)	OCS2	The tool gives praise for successful progress or accomplishment
		OCS3	The tool varies the schedule of reinforcements
		OCS4	The tool provides motivating feedback (praise) immediately following the task performance
Educational Elements	Teacher's Role (TER)	TER2	The tool provides teachers with opportunities to give feedback and comment on children's work
		TER3	The tool provides teachers with opportunities to reward students' work
		TER5	The tool allows teachers to design storytelling activities
		TER6	The tool allows teachers to modify storytelling activities
	Class Management System (CMS)	CMS1	The tool has a password-protected system to log in with different levels of authority and function
		CMS3	The tool allows the creation of teams to accomplish a task
		CMS4	The tool allows for the development of smaller learning communities
		CMS6	The tool provides criteria for evaluation practices
	Social Presence (SOP)	SOP2	The tool allows children to safely use various communication and discussion tools with colleagues, parents, and teachers
		SOP4	The tool has social rewards, such as "like" buttons and other incentives
		SOP6	The tool helps children to collaborate with colleagues, teachers and parents
Technical Elements	Usability for Arab Users (UAU)	UAU1	The tool supports the direction of writing from right to left for text
		UAU2	The m tool supports the direction of writing from right to left for numbers
		UAU3	The tool allows users to write with diacritical marks
	Usability for Children (UCH)	UCH2	The tool uses video-based help
		UCH3	The user interface uses funny, colourful, encouraging and entertaining content
		UCH4	The design of the user interface is easy and simple to use
		UCH5	The fonts (style, colour) in the tool are easy to customise
		UCH7	The user interface has a clear and consistent navigation
		UCH8	The user interface uses clear understandable icons
Total of items:			**35 items**

7.4 Summary

This chapter has explained the validation of the instrument that is known as the SET checklist. This instrument aims to help teachers to assess and identify an appropriate Arabic web-based story-writing tool for motivating children. The instrument has been developed through using the Goals-Questions-Metrics (GQM) approach and SETr framework as a reference. As a starting point, nine components and 62 items were established. Additionally, the developed instrument required validation. For the purpose of validation, two studies were conducted: content validity and experimental validation; a total of 14 participants were employed for the content validity. The procedure of content validity was commenced by proofreading the instrument items in the English language and subsequently translating it into Arabic. Following that, the procedure was ended by identifying the clarity, suitability and necessity of the items and items' scale. The data obtained from content validity was analysed by using content validity ratio (CVR); the results from the CVR indicted that just 49 items were large. As a result, the experimental validation was conducted.

In the experiments, a sample of 50 participants was used to assess the instrument following the content validity. Despite all the attempts to find Arabic web story-writing tools that represented all the items, the researcher's effort was not productive. Therefore, two prototypes were designed to validate the instrument's items. The data obtained was analysed for factor analysis, reliability, and correlation. The analyses were conducted to improve that SET checklist as a valid construct. Consequently, the final instrument consists of 3 factors, 9 components, and 35 items. After the experimental validation, the SET checklist could be summarised as a measurement for this context of the study. From the participants' feedback, the SET checklist was an easy and useful instrument in assessing and identifying an appropriate Arabic web-based story-writing tool, which would motivate children. What is more, the following chapter will show the development of the guidelines, which can be used as a reference for developers to develop Arabic web-based story-writing tools for children based on the framework of children' motivational requirements (SETr) and the SET checklist.

Chapter 8 (Study 3) Development and Validation of Guidelines for Web Designers to Design Motivated web-based story-writing Tools

This chapter presents a set of guidelines for designing web-based story-writing tools that motivate children to participate. The guidelines are a set of design considerations that are developed based on the SETr framework (refer to Chapters 4 & 5) and the SETcl instrument (refer to Chapters 6 & 7). Guidelines are suggested to help developers in designing Arabic web-based story-writing tools as well as to understand the applicability of the framework. The results identified that the guidelines that developed by both framework and guidelines are applicable to design these tools. Therefore, these guidelines are considered to help the designers in creating Arabic web-based story-writing tools that motivate children to participate. This chapter aims to answer the third research question of this research, which is:

RQ3: what are applicable guidelines for designing Arabic web-based story-writing tools that motivate children to participate?

8.1 The Guidelines for Learning Applications for Children

Guidelines for software, applications, or e-learning application for children, such as those found in (Al-Osaimi & Asma, 2012; Alfadhli & Alsumait, 2015; Davis et al., 2010) are developed to assist the anticipated users (developers/designers/programmers) with a certain amount of information on how they should develop an application, in their context of a particular study. Indeed, the information in a guideline contains standard suggestions/advice, which acts as a referral to users' actions and decisions.

The guidelines from Davis et al. (2010) are developed for the design of interactive software for children with autism, based on the researchers' experiences. Specifically, these guidelines are based on research experiences during the development of an interactive software game called *TouchStory*, which was designed to promote an understanding of narrative structures, while adapting to the learning needs of individual children with autism. The guidelines to develop *TouchStory* seem adequate to provide practical help for researchers or practitioners in developing similar applications. This was because the

guidelines resulted from direct experiences of teaching and engaging autistic children; thus, it carefully considered the characteristics and preferences of typical people with autism.

Other guidelines of research that relate to Arab culture have been proposed by Alsumait and Al-Osaimi (2010). The researchers build a set of guidelines that can be used for Arabic e-learning applications designed for six to ten years old children. the guidelines are developed based on a litrature review, as well as the outcomes from the experiments. Another study conducted in Arab countries involved a set of guidelines that were proposed based on a literature review, researchers' experiences, and an expert review, especially for the creation of e-learning games for children (Alfadhli & Alsumait, 2015).

The guidelines by Al-Osaimi and Asma (2012); Alfadhli & Alsumait (2015); Davis et al. (2010), were informed either by the review of literature, practices, and experiences in developing a related application, or both. Through literature and experiences, a guideline is required when there is a requirement to standardise information or to standardise a practice for a specific context of an application. In the study, the proposed guidelines follow a similar approach, as the literature has informed the framework (refer to Chapter 5) and instruments (refer to Chapter 7), which were utilised to develop the guidelines. These guidelines aim to provide a design recommendation for the researcher and web designer in developing Arabic web-based story-writing tools that motivate children to participate.

8.2 The Development of Guidelines

Based on the SETr framework, three factors are extracted as main categories for inclusion in the guidelines: sustainable, educational and technical requirements. Similar to the SETr framework and the SET checklist, the guidelines contain 3 main categories and 9 sub-categories. The main categories were divided based on the purpose and design consideration to create usable and motivational web-based tools for children to write Arabic Narrative. The purpose of each category is identified as follows:

I. Sustainable elements - to look at how the elements that sustain children's motivation are designed pre- and post- process of writing narrative in web-based tools.
II. Educational elements – relates to the functions or tasks that show how children are socialised and acquire help to complete tasks that can motivate children when undertaking tasks.

III. Technical elements – relates to the user interface design that motivates children to use the web tool.

In each main category, a description of the goal for each sub-category was identified, and then the guidelines for designers were generated based on the SETcl items for each sub-category. The guidelines are presented in the next section in the form of tables; each category and their related sub-categories have their own tables, which are divided into the guideline title and their description; sub-guideline and their description; and guideline for the designers. The final version of the set of guidelines is represented in three main tables based on the structure of the framework, which is available in Appendix L.4.

8.3 Validating the Guidelines

This section aims to determine whether the guidelines are valid by ensuring that the contents are suitable and adequate for inclusion in the guidelines. In order to do this, an evaluation was undertaken by a focus group with knowledge in web design. A group of experts participated with a computer science background that work in academic and/or professional fields and focus on web design, web development or usability evaluation to ensure a heterogeneous range of opinions. Correspondingly, a focus group discussion helps to collect experts' opinions from similar backgrounds and experience to argue and agree on the subject being discussed. Previous studies conducted a focus group discussion in relation to the interested subject, in order to validate their tool and guidelines (Hsu et al., 2013). The area of interest was discussed and summarised into related features and formed a general agreement among participants. Therefore, this approach was used as a reference to validate the guidelines. In the current study, experts' opinions have been collected and analysed as a base to support and confirm the guidelines. The following section involves the details of the study that was conducted.

8.3.1 Data Collection Method

To validate the developed guidelines, a focus group discussion was used for data collection. A focus group discussion is considered to be a part of an interview that generates descriptive data. Two steps were followed to validate guidelines: the first step involved proofreading and editing the guidelines; and the second step was a focus group discussion with experts who share the same interests or experience in the field. The group discussion was conducted with a small number of groups. The purpose of choosing small groups was to manage the

discussion easily and provide participants with the opportunities to express their opinions. Onwuegbuzie & Leech (2007) have summarised that approximately 3 to 5 focus groups are sufficient to reach saturation. However, Krueger. (1994); Morgan (1997); and Onwuegbuzie et al. (2009) recommended 3 to 6 participants for each focus group. Three focus groups were set for the current study and each group had six participants. The session of group discussion included one moderator, one assistant (note taker), together with the participants.

8.3.2 Participants

A total of 20 participants were recruited for the current study. All of the participants were aged between 25 and 40. Two participants were chosen to pilot the guidelines and eighteen participants were selected for the group discussion. The selected participants were PhD researchers or postgraduate researchers in computer science who work in academic and/or professional fields and focus on web design, web development or usability evaluation; a unique ID number was allocated for each participant. In total, 10 participants arrived on the day of conducting the focus group. The following Table 8-1 summarises the background for each participant.

Table 8-1 summary of participants backgrounds for focus groups discussion

ID	Participants	Affiliation
Focus Group 1 (24 April 2019)		
1A	PhD researcher in Gamification Design and motivation in learning management system, Male	University of Southampton
1B	PhD student in Computer Science, Female	University of Southampton
1C	PhD student in Computer Science, Female	University of Southampton
1D	PhD student in Computer Science, Female	University of Southampton
Focus Group 2 (25 April 2019)		
2A	PhD student in Computer Science, Female	University of Southampton
2B	PhD student in Computer Science, Female	University of Southampton
2C	PhD student in Computer Science, Female	University of Southampton
2D	PhD student in Computer Science, Female	University of Southampton
Focus Group 3 (2 May 2019)		
3A	PhD student in Human Computer Interaction, Female	University of Southampton
3B	PhD student in E-learning, Female	University of Southampton

8.3.3 The Design and Procedures of the Focus Group Discussion

The procedure of conducting the discussion group involved three steps: before, during and after the sessions, which started with an invitation to the participants until the completion the study. More details are as follows:

- **Before the study**, an email invitation was sent to the expected participants. If they agreed, they would be involved in the discussion session. The date, time and the place were arranged based on the participants' preferences.
- **During the study**, participants arrived at the location and time that had been arranged. They were asked to be seated, and offered drinks. Prior to the start of the session, the participants were asked to read the information sheet and sign the consent form. They were then provided with the guidelines to review for 10 minutes. As a moderator, the researcher reviewed the guidelines one by one and asked the opinions of each participant.

Through the discussion, the set of questions were prepared to investigate the clarity of the content of guidelines. The guidelines were discussed by asking these following questions:

- What do you think about the guidelines in general; is it logical?
- How can these guidelines help you in designing the web tool?
- What can be improved?

The group discussion was audio recorded after obtaining the consent of the participants. Each group session lasted 60 to 90 minutes.

- **After the study**, the researcher collected the guidelines' document and thanked all the participants for their invaluable participation.

8.3.4 Research Ethics

The ethical approval for the focus group was obtained from the Ethics Committee at the University of Southampton (Research Ethics Number 48563). Participants were provided with a participant information sheet and were subsequently informed that their participation was voluntary and could be terminated at any time during the study, and that all collected data was anonymous and would be analysed as a group. Appendix L presents all

the participants' material for conducting the focus group discussion: participants' information; consent form; instructions for participants**;** and Guidelines.

8.3.5 The Analysis of the Findings

The initial data analysis from the focus group discussions was undertaken by following the steps in thematic analysis. At the initial stage, the recorded data was transcribed manually, and as half of the discussion was in Arabic, the process was transcribe and then translated into English before starting the analysis. In the second phase of thematic analysis, the transcriptions were coded into nodes with its relevant data. The nodes were generated based on the summary of the discussions. Following this, the group of related nodes were collected together and linked to the discussion questions in Chapter 8.2.3. Then, the group of nodes were classified into themes, and at this point, an inductive approach was adopted to create a theme (see Chapter 5.1.4.1). Finally, this stage also involved defining what each theme mainly related to. It was essential that each theme presented an obvious scope and purpose, while the developer's opinions were discussed and summarised to validate the guidelines.

Based on the first two discussion questions that asked the developers about the guidelines, a total of five themes were generated. The words *understandable*, *logical* and *suggestions for future work* were found that correlated with the general opinions of the contents of the guidelines. By referring to the applicability of the guidelines, almost all the developers commented that the guidelines were applicable and covered several important aspects to guide similar Arabic websites. The list of themes are summarised by category in Table 8.2 below.

The developers were asked if they had any suggestions to improve the guidelines. There were some specific comments and suggestions provided for enhancement. The comments were discussed, and then, agreed for modification. The comments were synchronised between the three group discussions and summarised according to each of the sub-guidelines, as shown in Appendix M.

Table 8-2: List of Themes Summarised by Categories

Category	Themes	Descriptions
• Finding about guidelines in general	Clear and Understandable	The guidelines were found to be clear and understandable to use to design web story-writing tools for children
	Logical	The guidelines were found logical to design web story-writing tool for children
	Suggestions for future work	A consideration for future improvement that was not mentioned in the guidelines and not covered in the framework and the instrument
• Finding about the applicability of guidelines	Applicable	The guidelines were found to be applicable to design web story-writing tools for children
	Guide for similar Arabic websites' developers	The guidelines could guide developers in similar Arabic websites with the purpose of motivating children

8.3.6 Discussions of Feedback

The main goal of the current study was to ensure that the guidelines were suitable and sufficient. All the ten respondents of three focus group discussions agreed that the guidelines were logical and applicable, which reflect their experiences and practices; thus, the guidelines were considered suitable. Guidelines were identified as sufficient despite the enhancement that was provided for the content of the guidelines. The discussion involved positive comments, such as: "understandable"; "simple"; "easy to follow"; "guide for designing similar tools".

Some respondents in focus group one asked to re-order the content of the guidelines. They thought that the developer should follow a specific order to design this kind of website. Other focus groups (group 2 and 3) stated that the order of the guidelines seems to be suitable in its current status. Yet, the developers might not encounter serious issues regarding the specific order of these guidelines. Moreover, two groups (group 2 and 3) suggested that each sentence should be started with either "must" or "should", in order to indicate the necessity of these guidelines and to not be ignored by the developers. Experts prioritized each guideline by labeling 'Must', 'Should' or 'Could' based on MoSCoW techniques. The label 'Must' indicated that this guideline is critical in order to design this tool. The label 'Should' specified that this guideline is important but not necessary in order to design this tool. 'Could' referred to this guideline is desirable but not necessary and could improve the designing of this tool.

Meanwhile, two groups suggests to change the guidelines' titles from 'Sustainable elements (SE)', 'educational elements (EE)' and 'technical elements (TE)' into 'Sustainable Elements for Motivation before and after writing stories (SE)', 'Educational and Social Elements (ESE)', and 'User Interface Design (UID)'.

When respondents were asked of the ways that guidelines may help them in designing related websites for children, they believed that they could use guidelines as a reference to design similar Arabic application or websites. One particular participant mentioned that guidelines can be used to motivate children in mobile applications, as well as in an educational context. The guidelines that were stipulated by most of the experts as requiring revision were to add examples and to change the text; these points were mentioned in each sub-guideline, as shown in Table 9.7. One of the respondents suggested the possibility to enable the system to read the children's story with vocalisation of Arabic texts to help children add the diacritical marks. Separately, another respondent suggested adding accessibility tools.

8.4 The Guidelines

Based on the guidelines' validation, guidelines consist of 3 main categories, 9 subcategories, and 38 items (the guidelines' structure is illustrated in Figure 8.1. Each category is linked to a set of subcategories and the guidelines are presented in two sections: 1) the title of the main category with description; and 2) the description of the subcategory with items. Table 8.2, Table 8.3, and Table 8.4 present the guidelines for web designers to apply sustainable, educational, and social elements, as well as the user interface design for Arab children.

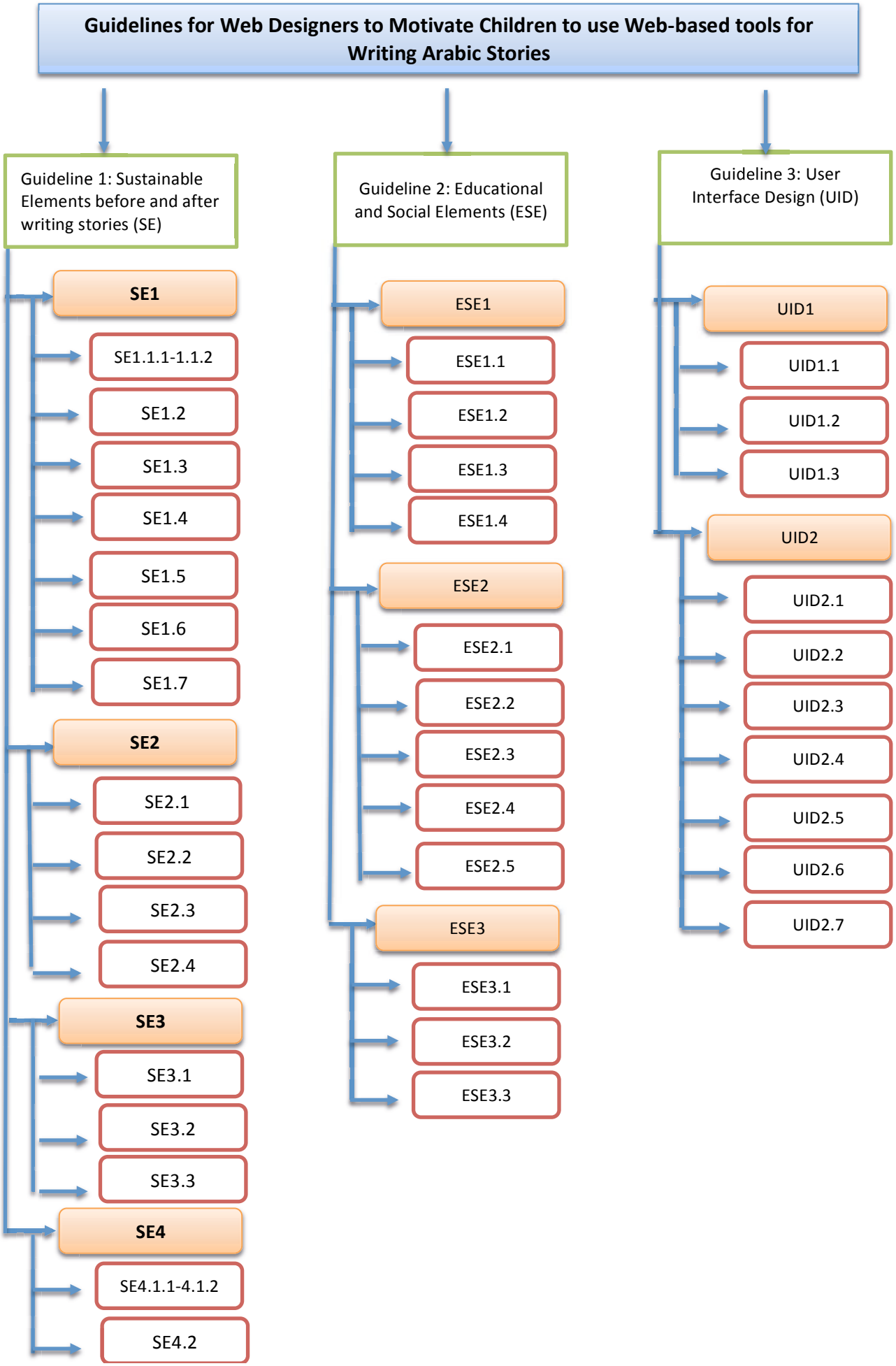


Figure 8.1: Guidelines' Structure

Table 8-3: The Guidelines for Applying Sustainable Elements

Guideline Title:	Sustainable Elements for Motivation before and after writing stories (SE)
Description	Sustainable elements in web-based tools are required to keep children motivated in the process of writing. The process requires different strategies before and after the writing process that should be applied in web-based tools. To develop motivational websites for story writing, designers should include the design elements that reflect the SETr framework and the SETcl instrument.
Sub-guideline SE1	Strategies for Obtaining Children's Attention
Description:	The web-based tools involve functions that could help to grab children's attention before they start to write stories. These functions should help children to maintain their motivation to complete tasks.
<u>Designers should consider the following guidelines:</u>	
SE1.1	The web tool must provide visual representations such as pictures that attract and inspire children to choose from, and subsequently create the story. SE1.1.1 pictures should be appropriate for the children's age. SE1.1.2 pictures should be appropriate for the children's gender.
SE1.2	The web tool must present simple different guided examples of written stories before starting the activity.
SE1.3	The web tool should include brainstorming and organising techniques, such as storyboarding and story mapping within the example and before writing activity (need example)
SE1.4	The web tool must add various formats of story-writing, such as comics, long form (more text, fewer images), and short form (more images, less text).
SE1.5	The web tool must provide the children with the options to choose from any pre-defined topic or pre-designed stories.
SE1.6	The web tool must enable the user to add multimedia from the web-library within written stories, such as a combination of texts, graphics, still images, animation, video, and audio.
SE1.7	The web tool must provide simple games or exercises before story writing by using a third party [for example: choose an appropriate word or organise a written story].
Sub-guideline SE2	Strategies for Establishing Children's Relevance
Description:	The story-writing tools involve characteristics in which the content relates to a child's interests before starting the activity of writing

	stories.
Designers should consider the following guidelines:	
SE2.1	The web tool must add a simple, ready, and familiar toolbar for writing, erasing and moving objects.
SE2.2	The web tool must enable children to access the system anytime and anywhere.
SE2.3	Based on children's profiles (gender, age, preferences); related pictures or story-writing material should be presented to write stories.
SE2.4	The web tool must use appropriate language that is suitable for the children's age.
Sub guideline SE3	Strategies for Gaining Children's Confidence
Description:	Using strategies that help learners develop a positive attitude and expectancy toward success
Designers should consider the following guidelines:	
SE3.1	The web tool must add optional challenges to create stories that aim to boost children's confidence.
SE3.2	The web tool must provide children with customising story-writing activities based on children's level and progress (for example, some applications give the user the choice to complete the activity again or to go to a higher level.
SE3.3	The web tool must provide children with a sense of independence, for example by text auto-evaluation. SE3.3.1 Try to avoid peer evaluation
Sub-guideline SE4	Strategies for Obtaining children' Satisfaction
Description:	The strategies that help learners attain satisfactory feelings after completing tasks
Designers should consider the following guidelines	
SE4.1	The web tool must add various rewarding options for successful progress or accomplishments, such as a badge, trophy and points.
SE4.1.1	The web tool must add unexpected reinforcements for a creative story, For example, if children write creative stories, they earn a number of coins.
SE4.1.2	It could be good if the tool varied the schedule of reinforcements, for example, children achieve one badge when they write three long stories.
SE4.2	Try to clearly show evident motivational feedback (praise) immediately following task performance.

Table 8-4: The Guidelines of Applying Educational and Social Elements

Guideline Title:	Educational and Social Elements (ESE)
Description	Educational and Social Elements that are related to how children socialise and obtain help to complete tasks. Following the SETr framework and the SETcl instrument, educational elements can support learning and motivation to undertake tasks and use the tool.
Sub-guideline ESE1	Teacher's Role
Description:	Story-writing tools involve functions for teachers that could facilitate children's motivation. These functions should contribute to encouraging children to write stories.
Guidelines for designers	
ESE1.1	The web tool must provide teachers with opportunities to provide feedback and comment on children's work.
ESE1.2	The web tool must provide teachers with the opportunities to view all students' stories, and reward students' work with, for example, a badge.
ESE1.3	The web tool must consider adding various options for teachers to design the assignment or the activity. For example, let them choose a title for the assignment, describe the assignment, use a photo to inspire their students, enable the use of spellcheck while writing their story or choice of use of writing with diacritical marks and specify a deadline for the assignment.
ESE1.4	The web tool must provide teachers with the opportunities to modify the assignment.
Sub guideline ESE2	Class Management System
Description:	The class management system has various techniques that teachers can use to keep children organised and productive during story writing.
Guideline for designers:	
ESE2.1	The web tool must provide a password-protected system to the class to log in with different levels of authorities and functions.
ESE2.2	The web tool must enable teachers to create a class.
ESE 2.3	The web tool must enable teachers to group children into teams in order to accomplish a task.
ESE 2.4	The web tool must enable teachers to add children to the class by their email or by the parent's email.
ESE 2.5	The web tool must provide teachers with opportunities for evaluation practice.

Sub guideline ESE3	Social presence
Description:	Social presence involves features to deliver a sense of connection with others (peers and parent). This kind of interaction can motivate children to use story-writing tools.
Guideline for designers	
ESE 3.1	The web tool must consider designing various communication and discussion boards to enable children to communicate with colleagues, parents, and teachers.
ESE 3.2	The web tool must offer social rewards, such as “like” buttons and other incentives.
ESE 3.3	The web tool must provide a collaboration function to invite colleagues, teachers and parents for helping children to complete the story.

Table 8-5: The Guidelines of Designing User Interface for Arab Children

Guideline Title:	User Interface Design (UID)
Description	User Interface Design refers to the web usability of the web user interface, which must have a user-friendly design. Following the SETr framework and the SETcl instrument. User Interface Design refers to technical elements that can support children’s motivation to design usable story writing tools.
Sub-guideline UID1	Usability for Arab Users
Description:	If the story-writing tool is designed for Arab users, the designer should consider designing the user interface in the Arabic language that supports writing activities and social interaction. These functions should contribute in encouraging children to write stories and use the tool.
Guideline for designers:	
UID1.1	The web tool must have a user interface that supports the direction of writing from right to left for the written text and numbers.
UID1.2	Try to add auto-tools that support writing the story. For example, the auto-correction tool to correct the grammar and vocabulary in Arabic text or auto-tools that add missing diacritics to Arabic text.

UID1.3	Try to enable the system to read the children' story with vocalisation of Arabic text to help children add the diacritical marks.
Sub-guideline UID2	Usability for Children
Description:	The design of the user interface has to meet the children's needs. The tool should be easy to use by children, in order to motivate them better.
Guideline for designers	
UID2.1	The web tool must provide help functions such as video-based help or hints to keep children feeling supported when users appear lost.
UID2.2	Try to design the website with funny, colourful, encouraging and entertaining content.
UID2.3	Try to design websites that are easy and simple to use.
UID2.4	The web tool must offer a customisation option of web content, such as fonts (size, style, colour).
UID2.5	The web tool must make the navigation simple and consistent.
UID2.6	Try to design clear and understandable icons.
UID2.7	The web tool must be accessible for people with disabilities.

8.5 Summary

This chapter has explained the development and validation of guidelines for designing web story-writing tools that motivate children to participate. These guidelines facilitate the task for the web designers to design story writing tools that motivate children to participate. In the development process, the guidelines were extracted from the SETr framework and the SETchecklist. The guidelines consist of the main categories, subcategories and items. Additionally, for the purposes of validation, the validation was conducted through focus groups discussion, as they are considered necessary to acquire specific expert's insight pertaining the suitability and sufficiency of the new developed guidelines. The discussion included 10 respondents who were divided into three groups.

The results from the discussion show that the guidelines were adequate and sufficient for the current study's context. The structure of guidelines also remained the same, while the guidelines' content was altered and edited based on the suggestions and comments of the experts. The discussions with the experts determined that the guidelines are applicable and can guide designers to design similar Arabic websites. Ultimately, the guidelines after validation consist of 3 main guidelines, 9 sub-guidelines and 38 items of guidelines. The following chapter discusses the

research results, and the discussion is based on three main research questions, as shown in Chapter One.

Chapter 9 Final Discussion

The current research investigated the requirements for motivating 9-12 year old Arab children to write narratives in web-based tools to answer three questions:

- **RQ1.** *What is a suitable framework for identifying the requirements that motivate 9-12 years old children whilst using Arabic web-based Story-writing tools?*
- ***RQ2:*** *What is the appropriate instrument to support Arab teachers in identifying and assessing Arabic web-based story-writing tools that motivate children?*
- ***RQ3:*** *What are applicable guidelines for designing Arabic web-based story-writing tools that motivate children to do the activities?*

The conceptual framework has been constructed based on issues that relate to psychological, cultural, educational, and technical perspectives (see Chapter Four). The framework of Sustainable, Educational and Technical requirements (SETr) that motivate children to write narrative whilst using web-based tools was validated through a triangulation of research, experts review and a survey of people who work with children, such as: parents, teachers, psychologists, and researchers (see Chapter Five). In addition, the SETr framework was utilised to measure the extent of applying motivational requirements in web-based story-writing tools, which support teachers in identifying and assessing these tools. For that, a measuring instrument called Sustainable, Educational and Technical checklist (SETc) was developed (see Chapter Six) and validated through a series of tests such as content validity, factor analysis (PCA), reliability and correlation (see Chapter Seven). The SETcl findings supported the development of the guidelines for web designers to design Arabic web-based tools that motivate children in writing narratives. The guidelines were validated, which consequently showed that the implicitly of the framework could be practically applied to design the web tool in this context of study (see Chapter Eight). In other words, the conceptual theoretical framework (SETr) contributes in developing the guidelines to be practically applied in designing the tools. The current chapter discusses and summarises the findings for each research question in the current study. Also, it determines the research limitations, practical suggestions, and the implications related to children's motivation in web-based tools.

9.1 RQ1: The Framework

RQ1: What is a suitable framework for identifying the requirements that motivate 9-12 years old children whilst using Arabic web-based Story-writing tools?

The framework of Sustainable, Educational and Technical requirements (SETr) produced results based on the research of children's motivation in the literature review from four aspects: psychological, cultural, educational and technical. Meanwhile, the framework consists of three main factors: sustainable, educational and technical. Each factor has different elements, such as: Obtaining Children's Attention; Teacher's Role; Usability for Children (see Chapter Four). These elements can be modified or manipulated in the design and future research. Additionally, the SETr framework was validated through experts' knowledge and people who work with children. Some elements that were suggested in the validation were refined and integrated within the existing elements as items that are considered important for children's motivation to write narrative in web-based tools.

In considering the children's motivation toward writing the narrative, the SET framework showed the importance of applying the ARCS model to be included in the framework, in order to understand the motivational strategies that sustain children's motivation levels whilst writing narratives in web-based tools. In general, using the ARCS model corresponds with research that mainly studied the effect of different media on learners' motivation to learn (Bolliger et al., 2010; Di, Blanca et al., 2013; Huang & Hew, 2016; Huang et al., 2006; Rodgers & Withrow-Thorton, 2005). However, the ARCS model in the SETr framework is general-based, but unsuitable to motivate children in the process of writing stories. Hence, following the analysis of experts' interviews (see Chapter 5.4), the combinations of strategies (items) were extracted, which are different from Keller's strategies from the ARCS model (see Chapter 3.3.3). Thus, it added another positive value to the related previous work that focussed on a specific context, such as writing a narrative.

The SETr framework demonstrated the importance of integrating the educational requirments in web-based tools that focused on socialising and acquiring help, such as the teacher's role, class management and social presence. These elements are in-line with the concept of socialising and gaining help to motivate children in a school enviroment (see Chapter 3.3). However, these elements were not adequately considered in the web-based tools. Consequently, the SETr Framework considered the importance of these elements in web-based tools. The experts; reviews suggested strategies that can be applied in web-based tools, which could possibly motivate children to complete tasks. These strategies were considered items for the existing elements in the SETr Framework, which could help in future research.

The technical requirements introduced in the SETr could have a positive effect upon children's motivation (see Chapter 3.4). For that, the SETr framework also supported the application of a usable user interface through two concepts: usability for children and usability for Arab users. The

importance of the usability for children in the SETr framework is consistent with previous related studies (Chiasson & Gutwin, 2005; Alsumait & Al-Osaimi, 201; Alfadhli & Alsumait, 2015). Moreover, the framework confirms the consideration of cultural issues that are discussed in the literature (Daniel et al., 2011; Wallace & Yu, 2009; Lindahl & Granath, 2006; Badre & Barber,1998). In order for the web tool to consider Arab children who are 9-12 years old, specific guidelines and principles need to take into account what is related to children's motivation. Specifically, experts suggested specific guidelines for each requirement, which are considered as items.

Consequently, the SETr framework is an integrative structure that identifies the motivational requirements for children to write narratives in web-based tools. This framework can be understood and supported by its factors, elements and items that connect together. Thus, the SETr framework is considered a suitable conceptual framework for motivating 9-12 years old children in writing Arabic narratives whilst using web-based tools.

9.2 RQ2: The Instrument

RQ2: What is the appropriate instrument to support Arab teachers in identifying and assessing Arabic web-based story-writing tools that motivate children?

The instrument was formed as a checklist, which was developed and validated to measure the amount of applied sustainable, educational and technical requirements in web-based tools that motivate children in writing stories. The instrument is called a Sustainable, Educational and Technical Checklist (SETcl) that was developed using the framework SETr, as well as items that are extracted from the experts' review as a reference. The Goal-Question-Metric (GQM) approach was selected to develop and extract the measurements for each element in the instrument (see Chapter 6.1). The SETcl provides features for motivating children in web story-writing tools that can sustain children's motivation whilst writing stories, support children in social interaction and acquire help, and user interface design for children and Arab users.

In order to produce a new developed instrument, several validation tests were conducted to assess the content and construct of items and ensure the use of the framework in this context of the study was valid (see Chapter Seven). The findings from the content validity show that the elements and items were necessary and suitable (see Chapter 7.1). Moreover, the results from the experimental and construct validation indicated that the items in each component statistically measure the same related underlined content (see Chapter 7.2). This indicates that SETcl is certainly a promising approach to measure sustainable, educational and technical requirements that motivate children to write stories in web-based tools.

As mentioned in Chapter Seven, it was necessary to develop a new instrument that was suitable for the current research study. Previous researches do not completely support or integrate with the work of SETcl, as can be seen when referring to sustainable elements, while the current available survey instrument, called IMMS, measured the attention, relevance, confidence and satisfaction in instructional tools, although this was not the focus of this study (Bolliger et al., 2010; Di et al., 2013; Huang & Hew, 2016; Huang et al., 2006; Rodgers & Withrow-Thorton, 2005).

Based on theories and the best practice research that has discussed educational requirements and children's motivation in offline environments (see Chapter 3.3), no instrument can measure how the teacher's role can be applied, class managements systems, and social presence in online educational environments. Social presence (peers and parents), for example, need to be available in the online tool to motivate children to write. Some available online tools such as Tikatok and StoryJumper (See Chapter 2.2.4) do not have features that support peers and parents interaction with children within the tool. In framework confirmation (See Chapter 5.2), experts suggested strategies to support the social presence of parents and peers in the tool. These strategies include parents' recognising and rewarding their children's work, receiving notifications of peers' achievements, and collaborating with colleagues, and parents. However, it is evidently natural for children to compare themselves academically with their peers, which can prove negative upon competence and self-worth, as social comparisons generally undermine students, which results in a reduction in assistance seeking (see Chapter 3.3.2). After content validity, expert suggested to delete this feature '**SOP5** The tool provides the children with notifications of peers' achievements' (See Appendix H).

Simões, Redondo, & Vilas (2012) attempted to determine how to apply social gamification in an existent K-6 social learning environment. Accordingly, that study had the same aim as the current study, which is to motivate children with educational tools, although their guidelines and features to achieve this goal are different from the current thesis. Finally, the usability for children was general-based for educational tools in previous studies, and not specifically towards motivating Arab children in web-based tools (Alfadhli & Alsumait, 2015; Alsumait & Al-Osaimi, 2010a; Chiasson & Gutwin, 2005b). Moreover, this thesis presents a way to measure how to apply usability for both Arab users and children in web-based story-writing tools.

In addition, developing and validating the SETcl instrument showed that it added a different perspective on measuring motivational elements in web story-writing tools, whilst also adding a new way to measure the sustainable, educational and technical elements that motivate children in web story-writing tools that should be designed for web story-writing tools. This SET checklist

was able to support Arab teachers in identifying and assessing web-based tools that motivate children to write Arabic narrative.

9.3 RQ3: The Guidelines

RQ3: What are applicable guidelines for designing Arabic web-based story-writing tools that motivate children to do the activities?

Based on the SETr framework and the SET checklist, the guidelines were developed to help web designers in designing web-based story-writing tools that motivate children to participate in writing stories. The guidelines were validated by using 3 focus groups discussion with 10 experts in computer science. The development and validation process for the guidelines are shown in Chapter Eight. The findings presented that the guidelines are clear, understandable, logical and applicable to use in designing web-based story-writing tool for children. The experts recommended adding points into the guidelines as future work. Moreover, they stated that the guidelines can guide developers in similar Arabic websites with the purpose to motivate children.

In the current study, guidelines' content was validated. Future research will focus on the acceptance of the guidelines by designing and developing prototypes of web-based story-writing tools based on the guidelines, which will be subsequently tested on children to examine their acceptance. Following that, the guidelines will be validated again.

Generally, it was agreed that guidelines' suggestions are considered adequate and suitable for this context of the study. Indeed, these guidelines can benefit the researchers or designers in future design. Hitherto, there have not been integral guidelines for motivating children aged 9-12 years old in Arabic web-based story-writing tools. The current study presents evidence to support the value of using the SETr framework and the SET checklist in designing motivated tools for children in this context of study.

9.4 Implications

The findings of the current research have various important implications for future research or practice in the relevant field. The implications in this research are divided into two related sections: implications for researchers and practitioners; and implications for educational contexts.

9.4.1 For the Researchers and Practitioners

The current research reviewed the importance of how to motivate children based on psychological, educational, cultural and technical perspectives. The SETr framework could be seen as a starting point to facilitate the exploration of a tool to motivate children in writing for researchers or practitioners. In general, other e-learning tools or online tools that require children's motivation could utilise the SETr framework.

Several possible implications can be made to help researchers in further research. Firstly, the researcher can customise the framework by adapting it into their context of study in order to investigate related research. Secondly, the interpretation of findings from SETr can assist in identifying significant research gaps. Thirdly, researchers can use certain factors or components in the SETcl instrument to evaluate and analyse available tools that intend to motivate children. This way can help them to choose an appropriate tool to conduct the related studies.

The SETr framework and the SETcl instrument offer practitioners the baseline for designing story-writing or similar tools that motivate children. These help them to analyse the design of current available tools and apply them accordingly. The current study involves unique guidelines to guide practitioners in designing story-writing tools or motivational tools that target Arab children. The guidelines could be understood as a preliminary idea for the practitioners' plans during the pre-design phase in developing web story-writing tools for children.

Furthermore, the researcher and practitioner can use SETcl to assess available story-writing tools and similar tools that motivate children. The findings help in identifying an appropriate design, features and content for web story-writing tools that target children. The impact of SETr framework, SETcl instrument, and the guidelines need to be evaluated by designing the prototype and by testing it on children for the purposes of acceptance.

9.4.2 For the Educational Context

In the educational context, the effects of a teacher's role on children's motivation levels in the classroom have been extensively researched. This research can add to the teacher's knowledge of the way of how to motivate children specifically in online story-writing tools. Teachers and researchers who participated in expert reviews believed that the outcome from the SETr framework would produce effective tools to understand children's motivation requirements in online environments. The current research provides teachers with a SET checklist to choose an appropriate tool to motivate children. Moreover, it can help the pre-service teachers' education to understand how to choose appropriate web-based tools that influence motivation of children.

As for the guideline, this research provides preliminary work to design tools that motivate children. In particular, consultants in educational technology can benefit from these guidelines, as they can develop educational strategies that motivate children during the use of online environments. When children participate with these kinds of tools, children will develop their skills in writing stories and communication in online environments. Thus, the current research can be improved and applied to other web-based tools that share the same educational goals.

9.5 Limitations

The current study has focused on designing web-based tools that motivate children to write stories. The framework has requirements based on theories and practices from different perspectives to motivate children. However, a number of limitations were identified in this thesis, which are important when both interpreting the presented findings and considering future directions. One of limitations is a lack of publications, educational materials, empirical studies and references in web-based tools for writing stories, especially for children. This can be challenging for a researcher, as no comparisons with other available frameworks can be made to identify significant elements in order to motivate Arab children. Therefore, the current study is also limited in comparing the developed instrument SETcl with similar existing instruments. Another limitation is related to the procedures of validation. This research was undertaken with Saudi teachers in public primary schools in western Saudi Arabia. However, including a diverse range of participants from various regions in Saudi Arabia or even from different nationalities could provide different recommendations for the instrument. Therefore, this could be expanded in future work.

Another limitation is that there are no Arabic story-writing tools available to validate the instrument. Three websites were used in the current study to conduct the experiment: two with an Arabic user interface and one English web story-writing tool. However, these websites were used to design the prototype, which has been designed carefully based on their features and characteristics in order to generalise the findings of this study. Two prototypes have been designed to validate the instrument's items. The prototypes were designed by using PowerPoint. Each slide in PowerPoint represents a screen in the web tool, and each link between an element on a slide and another slide represents a transition from one page to another in the web- based tool.

Some items were already represented on available tools while others were not implemented yet. Therefore, the prototypes were designed to present both items' functions that are not present in available tools, together with those that are already implemented in available tools. The available

tools have been chosen based on the functionalities of each tool that represent some items in the instrument. Every attempt was made to ensure that the two prototypes represented the subject matter of the items clearly.

9.6 Summary

This chapter has provided the discussion of the findings, as well as the implications and limitations of the current study. In the discussion section, three research questions have been discussed; the result of the discussions indicates that the work in this study has presented insight into how to motivate children in web-based story-writing tools based on sustainable, educational and technical requirements, as the SETr framework provides an integrated structure that can be used to motivate children in web-based story-writing tools. The SETr framework considered a new conceptual framework, which answered the first research questions. This chapter illustrated that each item in the SET checklist was implemented and developed carefully by using the SETr framework as a reference. The validation of the SET checklist confirmed the importance of the inclusion of the items in the SET checklist. Consequently, the answer to the second research question provided appropriate metrics for teachers to assess the web-based tools. The third research question discussed the applicability of the SETr framework and the SET checklist. The guidelines have been developed and validated based on the designers' recommendations. These guidelines can positively benefit researchers and designers in future research or in designing web based systems or applications that motivate children in general or for specific purposes, such as during writing stories

There are many implications as a result of the current study. The implications facilitated the exploration of a tool to motivate children in writing for researchers or practitioners. The propositions provided the teachers, pre-service teachers and consultants of educational technology with the opportunity to develop educational strategies that motivate children during the use of online environments. The research also indicates a number of limitations, such as a lack of related studies, the research conducted in one region, and a lack of Arabic web-based story-writing tools. Therefore, these limitations can be considered in future research.

Chapter 10 Conclusion and Future Work

In the current research, the concept of story-writing tools, which is borrowed from digital storytelling that focused on writing, was addressed. As discussed in the literature, several studies have confirmed that the effectiveness of digital storytelling in enhancing students' skills includes: motivation, writing, reading, problem solving, collaborative learning, and critical thinking in educational context. On the other hand, teachers use story-writing strategies as a mechanism to improve the student's ability to write stories in terms of their use of grammatical structures and to expand vocabulary. Story-writing tools can further contribute to motivate children in gaining knowledge and developing their cognitive structures. However, there remains a lack of story-writing tools in general, and specifically those that support the Arabic language for older children (9-12 years old).

Moreover, a teacher's first responsibility is to motivate students to write stories; it is important for teachers to know what they are looking for and the developer to know what to incorporate into Arabic story-writing tools. However, there is still a lack of a framework and guidelines for children's motivational requirements and their implementation in story-writing tools. Therefore, it was initially necessary to investigate what are sustainable, educational and technical requirements from a teacher's perspective to motivate a child to write stories. Therefore, this current study has developed a conceptual framework of Sustainable, Educational and Technical Requirements (SETr) that motivates children in Arabic story-writing tools.

This chapter concludes the research conducted for the current thesis. The chapter starts with a summary of the research, followed by the contributions this research makes, and finally proposes potential future work and research.

10.1 A Summary of Research

The current study is divided into three main parts: the development of the framework; the validation of the use of the framework; and the applicability of the framework. Each part presents one of the research questions.

10.1.1 Development of the Framework

Chapter Four discussed in detail the newly developed framework *of sustainable, educational, and technical requirements (SETr).* The conceptual framework was grounded based on the process of assessing, filtering, combining and categorising, from a literature review of motivational theories,

learning theories, cultural, and technical requirements (see Chapter Three). The factors that affect child motivation are categorised based on sustainability, educational, and technical factors; each of these factors is represented by several components. The revised components consist of 9 components and they are: *strategies for obtaining children's attention (OCA); strategies for establishing children's relevance (ECR); strategies for gaining children's confidence (GCC); strategies for obtaining children' satisfaction (OCS); teacher's role (TER); class management system (CMS); social presence (SOP); usability for Arab users (UAU); and usability for children (UCH)*.

The formulation of the framework triangulated the literature with interviews of experts and responses from those who were working with children aged 9 to 12 years old, such as parents, teachers, researchers and psychologists. The result of this triangulation demonstrated that all the factors in the framework were regarded as important. However, a few components were suggested but included within existing factors. Moreover, the SETr framework was developed to provide a structured reference point for children's motivational requirements in story-writing tools. Meanwhile in practice, the framework is expected to be utilised as a reference tool in the design process of designing a story-writing tool. Furthermore, the purpose of the investigation was to initially identify the factors that could affect child motivation to understand what elements are required to obtain child motivation and subsequently create an instrument for teachers to evaluate appropriate Arabic story-writing tools that motivate children.

10.1.2 Validation of the Use of the Framework

Further exploration was made on the framework to determine how to apply the motivational requirements on the Arabic story-writing tools. In particular, it can be used to evaluate and identify appropriate Arabic story-writing tools that can motivate children. For that reason, Sustainable Educational Technical Checklist (SETcl) was developed to measure the extent of Arabic story-writing tools that have elements that motivate children to write stories. For the purposes of development items in the SETcl, the Goal-Question-Metrics (GQM) approach was utilised through the SETr framework as a reference. Each item was derived from the goal defined for each SETr component and from the related questions that were created to achieve the goal.

After the development of the instrument, the components and items for the SETcl were confirmed based on the positive results from the validation tests ((see Chapter 6 &7)). The SETcl was considered valid and reliable for what it measured; this instrument is expected to be beneficial to support teachers in identifying the extent of the presence of the SETcl content in the

Arabic story-writing tools. Besides that, the instrument could inform the web developer and web designer regarding the applicable design for motivating children in story-writing tools.

10.1.3 The Applicability of the Framework

By considering the SETr framework and SET checklist, guidelines were developed to design and increase the clarity of the applicable SETr framework and the SET checklist. The guidelines reflect the components in the SETr framework and items in the SET checklist. The guidelines were divided based on the purpose and the design of the tool. A total of 3 main guidelines, 9 sub-guidelines, and 38 items of guidelines were validated by the focus group discussions. The guidelines were discussed and reviewed based on the focus groups' results. Additionally, the guidelines were considered suitable and sufficient. It is expected that the guidelines can benefit the researcher to develop similar guidelines or produce a reference for similar research areas, such as e-learning. For practitioners, the guidelines can help in generating initial ideas for the appropriate design of similar educational tools that target children's motivation.

10.2 Contributions

In general, the current study has made a contribution in the field of Arabic educational technology. Three main contributions were made by this research, as the following highlights:

- Developed and validated the SETr framework;
- Developed and validated the SET checklist;
- Developed and validated guidelines for designing Arabic web-based story writing tools.

Each contribution is described in the following sections.

10.2.1 The Framework for Children's Motivational Requirements in Arabic Story-Writing Tools (SETr)

The main and first contribution of the current research is the SETr framework. Related contributions were made during the development and validation of the framework. These contributions are described as follow:

- Incorporation of appropriate learning and motivation theories in order to improve knowledge about what are the requirements to motivate children to complete tasks that act as the guideline.
- The use of motivational theory in informing the learning and motivation effects upon users' motivation.

- Analysis and integration of the existing guidelines and principles of heuristic usability and child usability.
- Analysis of the cultural requirements that relate to Arabic language.

10.2.2 An Instrument: Sustainable, Educational, Technical checklist (SETcl)

This instrument of SETcl is considered the second contribution of the study that shows the outcomes from the use of the SETr framework. The SETcl was developed and tested to measure the extent to which the SETcl content is present in the story-writing tools; the instrument was tested by Arabic teachers through two experiments. The findings confirmed that the SETcl is an appropriate instrument to support teachers in identifying the extent of presence of the SETcl content in the story-writing tools. Related contributions were made as follows:

- The SETcl could be integrated in another instrument or another research survey to evaluate the design aspects that relate to children's motivation in educational applications.
- The application of a commonly accepted approach for instrument development.
- The application of commonly accepted methodologies that have been integrated for the instrument's validation.

10.2.3 Guidelines for Designing Arabic Web-based Story-Writing Tools

The final contribution of the current research was through a group of guidelines to be applicable to the SETr framework and the SET checklist in designing Arabic web-based story-writing tools that motivate children. Accordingly, the guidelines were considered mixed from the SETr framework and SET checklist. Guidelines can be used as a reference in developing educational tools that target children's motivation and story-writing.

10.3 Future Work

The current research has shown the key requirements in the SETcl framework for motivating children in Arabic story-writing tools (SETr); the future work is to develop a prototype or an application that follows the SETr framework and the developer guidelines. This would be part of the development phase that helps to reduce the risk of using inappropriate approaches when applying SETcl content in story-writing tools. Moreover, further research can be conducted as shown in the following sections.

10.3.1 Expanding the Conceptual Framework

Future research can conduct more investigations and exploration of children's motivational requirements to expand the SETr framework. Therefore, future research may involve exploring the motivational technologies from the perspective of technical aspects. For example, it will be possible to look at gamification and how to apply it in an effective way. This could be done by analysing the related story-writing or (educational) tools that use gaming elements in the market. This analysis can provide insights into the details of the relation of the game elements within the framework.

10.3.2 Validation and Application of the SETcl

The SETcl instrument was tested and validated by using experimental studies. These studies are required to ensure that each item measures the same related concepts from teachers' points of view. What is more, future work could take into account a wider variety of participants in the validation experiment; for example, to involve participants, such as children with different ages, web designers, web testers, and project managers. This suggestion could determine the relative priority of the SETcl items and explore more new components and items.

Another potential future study could be suggested that relates to the method of analysis. The Rasch Model (Brockmyer et al., 2009; Chen et al., 2017; Ching-Lin Shih, 2014; Siddiq et al., 2017) can be used instead of the factor analysis (see Chapter Seven) when validating the SETcl instrument that could be applied to analyse the suitability of the items in the instrument.

10.3.3 Implication in a Specific Context

A further study with more focus on culture is therefore suggested, which could examine the effects of cultural aspects on the design of story-writing tools to motivate children. One of the components of the SETr framework focused on the language as a cultural aspect to design story-writing tools. However, investigation of cultural feedback is required to be tested. It could also be possible to add measurements items related to cultural aspects. Another possible future extension of this research is to look into the other children's demographic information (e.g. children's ages, children's gender, children's nationalities). The result could be analysed in order explore the effects of applying Sustainable, Educational, Technical requirements (SETr) in story-writing tools which take into account varying participants' demographics. Based on that, the framework could be extended into other contexts. Hence, the framework might be used in related studies in order to understand the situation, and the instrument could measure the suitability of

the existing story-writing tools for children, or the guidelines could be adopted to develop related tools for educational contexts.

10.4 Final Remarks

The main goal of the current study was to understand children's motivational requirements in story-writing tools. It is expected that this can help teachers to identify and assess appropriate story-writing tools to motivate children. The SETr framework in the current study provides a stepwise way of understanding children's motivational requirements in story-writing tools through looking at the requirements from sustainable, educational and technical aspects based on theories and the best practice studies. These aspects help to identify the factors and their related components, and thus, they were used as a basis to construct the framework. The identified factors and components in the SETr framework were found to be necessary for children's motivation in story-writing tools.

The results of this study have illustrated that the SETr framework can provide insight and analysis into suitable design tools for motivating children in educational contexts. The outcome of the framework could inform the researchers or educational technology practitioners when making decisions on designing and developing story-writing tools for children. Therefore, further research should look into the effectiveness of the story-writing tools upon children's motivation.

Appendices

Appendix A: Design of Interview Questions (English and Arabic version)

Appendix B: Questionnaire Design (English and Arabic version)

Appendix C: Sample of responses to interview questions in English version

Appendix D: Thematic Analysis for Expert Interview

Appendix E: Applying GQM Approach for generating items

Appendix F: The instrument SETchecklist After Applying GQM approach (English and Arabic Form)

Appendix G: Evaluation document for the purpose of content validity

Appendix H: The Instrument Items based on the result of the Content Validity Ratio (CVR)

Appendix I: The instrument (SET checklist) after Content Validity (Arabic and English Form)

Appendix J: Participants Material for experimental validation

Appendix K: The Results of Second Run for Exploratory Factor Analysis

Appendix L: participants' Materials for conducting the Focus groups

Appendix M: Focus Group Comments and Suggestions

Appendix A **Design of Interview Questions (English and Arabic version)**

job **العمل**
years of experiance **عدد سنوات الخبرة**
To what extent do you agree that the following requirements can motivate children to write digital Arabic stories **إلى أي مدى أنت توافق على أن العوامل التالية تؤثر على تعلم الطفل ودافعيته لكتابة القصص العربية الرقمية**
Questions related to sustain child motivation
1- Do you think getting child attention is an important requirement for learning and motivation to write digital Arabic stories? If yes how do you think can we get the child attention? 1 هل تعتقد أن مستوى انتباه الطفل عامل مهم للتعلم والتحفيز لكتابة القصص الرقميه العربية؟ إذا كان الجواب نعم كيف تعتقد أنها يمكن أن نحصل على انتباه الطفل؟
2- Do you think applying strategies that relevant to the child is an important requirement for learning and motivation to write digital Arabic stories? If yes how do you think can we get the child relevance? 2 هل تعتقد أن مستوى صلتها للطفل هو عامل مهم للتعلم والتحفيز لكتابة القصص الرقمي العربيه؟ إذا كان الجواب نعم كيف تعتقد أنها يمكن أن نجعلها ذات صلة للطفل؟
3- Do you think getting children' confidence is an important factor for learning and motivation to write digital Arabic stories? If yes how do you think can we get the child confidence? ٣ هل تعتقد أن مستوى الثقة الطفل هو عامل مهم للتعلم والتحفيز لكتابة القصص الرقميه العربيه؟ إذا كان الجواب نعم كيف تعتقد أنها يمكن أن نحصل على ثقة الطفل؟
4- Do you think getting child satisfaction is an important requirement for learning and motivation to write digital Arabic stories? If yes how do you think can we get the child satisfaction? ٤ تعتقد أن مستوى الرضا للطفل هو عامل مهم للتعلم والتحفيز لكتابة القصص الرقمية العربية؟ إذا كان الجواب نعم كيف تعتقد أنها يمكن أن نحصل على رضا الطفل؟
Questions related to educational requirements
5- Do you think teacher role is an important requirement for learning and motivation to write digital Arabic stories? If yes how? 5 هل تعتقد أن اللغة هي عامل مهم للتعلم والتحفيز لكتابة القصص الرقميه العربيه؟ إذا كان الجواب نعم كيف تعتقد اللغة يمكن أن يؤثر؟
6- Do you think providing online environment that look like school culture such as class management system an important requirements for children' learning and motivation to write digital Arabic stories? If yes how? 6 هل تعتقد تزويد الاطفال ببيئه مشابهه لبيئة المدرسة مثل نظام لادارة الطلاب هو عامل مهم للتعلم والتحفيز لكتابة القصص الرقمي العربي؟ إذا كان الجواب نعم كيف ؟
7- Do you think social presence such as parent or peer; is an important requirement for learning and motivation to write digital Arabic stories? If yes how? 7 هل تعتقد أن التأثيرات الاجتماعية مثل الوالدين أو الأقران، هو عامل مهم للتعلم والتحفيز لكتابة القصص الرقمي

العربي؟ إذا كان الجواب نعم كيف ؟
Questions related to the technical support
8- Do you think Usability for Arab users is an important requirement for learning and motivation to write digital Arabic stories? If yes how? 8 هل تعتقد أن قابلية استخدام النظام للمستخدمين العرب هو متطلب مهم لتعلم الأطفال والتحفيز لكتابة القصص الرقميه العربيه؟ إذا كان الجواب نعم كيف تعتقد نظام الاستخدام يمكن أن يؤثر؟
9- Do you think Usability for children is an important requirement for learning and motivation to write digital Arabic stories? If yes how? 9 هل تعتقد أن قابلية استخدام النظام للاطفال هو متطلب مهم لتعلم الأطفال والتحفيز لكتابة القصص الرقميه العربيه؟ إذا كان الجواب نعم كيف تعتقد نظام الاستخدام يمكن أن يؤثر؟
General Questions
10- Are there any requirements missing? ١٠ هل هناك عوامل اخرى ترغب في اضافتها؟
11- Would you change any of these requirements? ١١ هل ترغب في تغيير احد هذه العوامل؟
12- Can you tell me more about requirements influence child learning and motivation to write digital Arabic stories? ١٢ هل هناك عوامل اخرى تعتقد قد تؤثر لتعلم وتحفيز الطفل لكتابة القصص العربيه الكترونيه؟

Appendix B **Questionnaire Design (English and Arabic version)**

Questionnaire (English and Arabic version)

هذا البحث يهدف إلى دراسة العوامل المؤثرة على تحفيز الطفل من عمر ٩الى١٢ سنة لكتابة قصة رقمية عربية ويقصد بالقصة الرقمية هي التي تنتج وتحفظ وتنشر باستخدام وسائط رقمية بحيث يتم توظيف الصوت ،المؤثرات الصوتية ،النصوص ،الصور ،الرسوم ،والفيديو لخدمة أغراض تربوية. للتعرف أكثر على مثال يوضح القصة الرقمية ،أرجو الضغط على الرابط أدناه

https://www.youtube.com/watch?v=Tx5K5S0vDUo

الهدف من هذا البحث هو تقديم توصيات تساعد على تحفيز الأطفال السعوديين للقيام بكتابة قصة رقمية ،والتي بدورها من الممكن يمكن أن تزيد من اعتماد القصة الرقمية كطريقة تفاعلية لتساعد على تحفيزالطفل على الكتابة. مشاركتكم سوف تساهم في تحديد الإتجاهات المستقبلية بالإضافة إلى أنها سوف تساعد الباحثين والمهتمين في هذا المجال .

مشاركتك في تعبئة الاستبانة لهذا المشروع البحثي هي مشاركة تطوعية وسيتم التعامل مع جميع الإجابات بسرية تامة بحيث لا تشير إلى هوية المشارك واستخدامها سيكون لغرض البحث فقط

سوف تستغرق هذه الاستبانة الإلكترونية قرابة الخمس دقائق لإتمامها

في نهاية الاستبانة يمكن وضع بريدك الإلكتروني حيث سوف تكون لديك الفرصه للفوز بقسيمة شرائية من موقع أمازون kamazon .co.u بقيمة ٥٠ جنيه استرليني حيث سيتم السحب على قسيمتين شرائيتين لاثنين من المشاركين بشكل عشوائي . وسوف يتم التواصل معك عن طريق البريد الالكتروني علماً بأن البريد الالكتروني لن يرتبط بإجابتك نهائياً وسوف يتم حذف جميع المعلومات بعد الانتهاء من السحب.

إذا كان لديك أي استفسار حول هذا البحث فلا تتردد في مراسلة الباحثة على البريد الالكتروني التالي:

مشاعل عسيري

Mma2g14@ecs.soton.ac.uk

هذا البحث باشراف

Dr.Gary Wills gbw@ecs.soton.ac.uk

Prof. Mike Wald mw@ecs.soton.ac.uk

Introduction

The requirements to motivate child to write Arabic digital stories in Saudi Arabia

The project is being conducted in order to examine the requirements that motivate children to write Arabic digital story. Digital stories allow student or teachers to produce, save, and publish stories by using digital media such as sounds effects, voice, text, image or videos for educational purposes.is intended digital story is produced and kept and published for using the modes Digital so that it is sound and sound effects, text, images, graphics, video hire and to serve educational purposes. To learn more on the story digital Please click on the link below

https://www.youtube.com/watch?v=Tx5K5S0vDUo

The goal of this research is to make recommendations to help motivate Saudi' children to write a digital story, which can increase the adoption of digital interactive stories as a way to help stimulate the child in writing. Your participation will contribute to determining future direction of digital storytelling in Saudi Arabia. In addition, it will help researchers and those interested in this field.

Your participation in this research project is voluntary. All responses remain confidential.

This web-based survey should take 5 minutes to complete.

If you wish you will be entered in a prize draw, where you have the opportunity to win one of two £50 amazon.co.uk vouchers as an appreciation for your time. If you wish to take part you will need to provide your email address at the end of the study. This will be kept separately to the answers to your questions so there will be no way of linking your email address to your answers and you will be contacted by email if you win. For further details, please contact either my study supervisor, or myself

Mashael Asiri: mma2g14@ecs.soton.ac.uk

Gary Wills: gbw@ecs.soton.ac.uk

Mike Wald: mw@ecs.soton.ac.uk

□ Please tick (check) this box to indicate that you consent to taking part in this survey يرجى وضع علامة (صح) في المربع عند الموافقه على تعبئة الاستبيان

Section 1 الجزء الاول

1. **What best describes you?**

هل أنت أحد ال(يمكن اختيار اكثر من خيار)؟

a) Parents الوالدين
b) Teachers المعلمين/ المعلمات
c) Researchers الباحثين/ الباحثات
d) Psychologists الاخصائيين/ الاخصائيات النفسيين
e) others

2. **What is your educational level** ماهو مستواك التعليمي؟

a) Lower level than Bachelor's Degree أقل من الدرجة الجامعية
b) Bachelor's Degree الدرجة الجامعية
c) Master's Degree درجة الماجستير
d) Ph.D. درجة الدكتوراة
e) Not Sure غير متأكد

3. **From which region in Saudi Arabia you are?**

من أي منطقة بالسعودية؟

a) Najd Region (Center) المنطقة الوسطى
b) Hijaz Region (West) المنطقة الغربية
c) North Region المنطقة الشمالية
d) South Region المنطقة الجنوبية
e) East Region المنطقة الشرقية

4. **Have you ever dealt with child from 9-12 years old?**

هل سبق وأن تعاملت مع طفل من عمر ٩ إلى ١٢ سنة؟

a) Yes نعم
b) No لا

5. **If yes, how many years of experience do you have dealing with children at that age?**

اذا كانت إجابتك للسؤال السابق نعم،كم عدد سنوات الخبرة التي تملكها في التعامل مع أطفال في ذلك السن؟

a) Less than 3 years أقل من ٣ سنوات
b) 3 years and more ٣ سنوات أوأكثر

6. **What is the child gender؟** ماهو جنس الطفل(يمكن اختيار خيار واحد أو الخيارين معا)؟

a) Male ذكر
b) Female انثى

7. **What is the education that your child's school follows?**

ماهو النظام التعليمي الذي تتّبعه مدرسة طفلك؟

a) Saudi national educational system النظام التعليمي السعودي الوطني
b) International educational system النظام التعليمي الدولي
c) Other اخرى

8. **The child is enrolled in?**
الطفل يدرس في:

a) Public school مدارس حكومية
b) Private school مدارس خاصة
c) International school مدارس عالمية
d) Other أخرى

9. **Does your child have interest in digital stories or has he showed interest in writing a digital story?**
هل يوجد لدى طفلك أي اهتمام بالقصة الرقمية أو سبق وأظهر اي اهتمام في كتابة قصة رقمية ؟

a) Yes نعم
b) No لا
c) Not sure غير متأكد

section 2 الجزء الثاني

To what extent do you agree that the following requirements are important to motivate child who ages 9-12 to write Arabic digital stories in Saudi Arabia?

الى أي مدى أنت توافق أن العوامل التالية هي مهمة للتأثير على تحفيز الطفل الذي عمره من ٩ ل١٢ سنه لكتابة قصة رقمية عربية في المملكة العربية السعودية؟

No	Statements	Strongly agree اوافق بشدة	Agree اوافق	Neutral محايد	Disagree لا اوافق	Strongly isagree لا اوافق بشدة
1	**Using strategies that obtaining children's Attention** is important to motivate child to write stories in online story-writing tools الحصول على انتباه الاطفال ضروري لتحفيز الطفل لكتابة قصة رقمية					
2	**It is important to establishing relevant strategies to the child to increase his/her motivation** to write stories in online story-writing tools من المهم جدا إنشاء استراتيجيات ملائمة للطفل لتزيد من تحفيز الأطفال					
3	**Using strategies that Gaining Children's confidence** is an important requirements to motivate child to write stories in online story-writing tools الحصول على ثقة الاطفال هو عامل مهم لتحفيزهم للقيام بكتابة قصة رقمية					
4	**Using strategies that obtaining Children's satisfaction** is an important requirement to motivate child to write stories in online story-writing tools. الحصول على رضا الطفل هو عامل مهم لتحفيزه لكتابة قصة رقمية.					

5	**Teacher role** is an important requirement to motivate child to write stories in online story-writing tools. دور المعلم هو عامل مهم لتحفيز الطفل لكتابة قصة رقمية					
7	**Class management** system (such student capacity and student' evaluation) must be available to motivate child to write stories in online story-writing tools. نظام ادارة الصفوف مثل (السعة الطلابيه و تقييم الطلاب) لابد أن تكون متوفرة لتحفيز الطفل لكتابة قصة رقمية					
9	**Social presence** on children (such as parents or friends) is an important requirement to motivate child to write stories in online story-writing tools. التأثير الاجتماعي على الطفل (مثل تأثيرالوالدين والأصدقاء) هو عامل مؤثر في تحفيز الطفل لكتابة قصة رقمية					
10	**Usability for Arab user (such as Arabic language requirements)** is an important requirement to motivate child to write stories in online story-writing tools. سهولة استخدام الاداة للمستخدمين العرب (مثل متطلبات اللغه العربيه هو عامل مهم لتحفيز الطفل لكتابة قصة رقمية					
11	**Usability for children** is an important requirement to motivate child to write stories in online story-writing tools. سهولة استخدام الاداة للأطفال عامل مهم لتحفيز الطفل لكتابة قصة رقمية					

Appendix C **Sample of responses to interview questions in English version**

Expert A interview Transcripts		
Interview transcripts	Initial coding	Sub-Themes
Interviewer: Do you think getting child attention is an important requirement for learning and motivation to write digital Arabic stories? If yes how do you think can we get the child attention?	• Visual representation • Brief gaming activity • Interactive material or multimedia	Getting child attention
Expert A: Yes, *it is an important requirement for example if we provide child with library of images such as animals or people we can get the child attention to attached images with written stories and then publish it. So, child attention will affect on their speed when they writing and affect in the connected ideas. Another example audio instructions, which designed to guide and interact with child. Moreover game engine which give different scenarios when child written or chosen words. For example, Samir woke up in the morning and then the program is developing options, and then eats his food or wash his face Based on the selection of the child STORY consistency of the track who is chosen. Interactive story writing help the child build a story there may be a ready-made models make the child enters certain words as he woke up in the morning the child may write some information Or we can give them the Beginning of the story as a start point and then he can use his imagination to complete the story. So, as I said yes is an important factor by adding interactive elements such as audio and pictures.*		
Interviewer: Do you think applying strategies that relevant to the child is an important requirement for learning and motivation to write digital Arabic stories? If yes how do you	• Familiarity to the children	Getting children'

think can we get the child relevance?		relevance
Expert A: *Undoubtedly if writing stories linked to his life, it could be easy to add his thoughts in the stories such as if the child lives in desert environment and required him to write about the South Pole may be it is difficult because he did not live in Antarctica and does not know any details about the environment as opposed to desert* *Or from another point of view it's possible the child to like write about another environment. So, I will change my answer. The child remains innovative writer even if not close to their environment (who writes the story will continue in writing because he like it)*		
Interviewer: Do you think getting children' confidence is an important factor for learning and motivation to write digital Arabic stories? If yes how do you think can we get the child confidence?		Getting children' confidence
Expert A: *Yes such as game elements in the principle of rewards that reward the child at the end of any achievements such as appear on the page a prize or motivational phrases.*		
Interviewer: Do you think getting child satisfaction is an important requirement for learning and motivation to write digital Arabic stories? If yes how do you think can we get the child satisfaction?	• Praise for successful progress or accomplishment	Getting children' satisfaction
Expert A: *Is similar to the previous question, in the principle of rewards that reward the child at the end of any achievements but complacency is giving incentives and confidence may come from external factors, such as family and friends was frustrating in that may adversely affect the writing has to be a smuggler for the child who faced problems with writing mode and how to be confident? By putting his page on all his works and we present to him was working his network, but it may be a dangerous weapon on a child,*		

because some of the comments may be frustrating but it is possible to put restrictions for publication may be exclusive to the child and his family		
Interviewer: Do you think teacher role is an important requirement for learning and motivation to write digital Arabic stories? If yes how?		Teacher role
Expert A: *Yes but I think teachers need to take training courses before, and I don't know what do they need exactly to motivate the child in the tools. You need to ask them*		
Interviewer: Do you think providing online environment that look like as school culture such as class management system an important requirements for children' learning and motivation to write digital Arabic stories? If yes how?		Class management system
Expert A: *Yes, If there are more interactive learning in the classroom and the surrounding environment that will be better than traditional learning.*		
Interviewer: Do you think social presence such as parent or peers; is an important requirement for learning and motivation to write digital Arabic stories? If yes how do you think social presence can affect?		Social presence
Expert A: *Of course it affects. If the social environment do not care of writing Arabic stories, the child will not motivated to write, unlike if their parents supported them by reading and writing stories in Arabic.*		
Interviewer: Do you think Usability for Arab users is an important requirement for learning and motivation to write digital Arabic stories? If yes how?	• writing with diacritical marks • Visual library that reflects Arab culture	Usability for Arab user
Expert A: *Yes, we need to take into our account requirements of Arabic language and Arab culture for example if children want to write stories with diacritical marks. in my opinion child could unmotivated when writing with diacritical marks. For example if child write without diacritical marks can be*		

write 7 lines while with diacritical can be write 4 lines. *Linguistically will be benefits.* *And another points as I said before visual library must has images related to child culture because It is possible if the child lived in a desert environment and he is required to write about the South Pole, it would be difficult for him to write because he doesn't know any details about it, unlike the desert environment*		

Appendix D**Thematic Analysis for Expert Interview**

Theme	Subtheme	Participant Codes	Example
Obtaining children's Attention	Visual representation	A	"Provide child with library of images such as animals or people we can get the child attention to attached images with written stories and then publish it"
		C	For example, give the children three themes and if he chooses the subject he finds interesting pictures may be inspired by the story of the pictures and starts writing"
		D	"For example, I show the pictures for children to get their attention and then I discuss with them about the contents of the picture such as characters, actions and time"
		F	"Getting child attention is important such as applying pictures"
	Examples	H	"we may be able to attract children' attention by providing written or readable stories that can help the child to design their story"
		J	"to grab child attention we ask children to read story and then begin to write. So before the process of writing, we need to use brainstorming techniques and examples"
	Brainstorming and organising techniques	J	"to grab child attention we ask children to read story and then begin to write. So before the process of writing, we need to use brainstorming techniques and examples"
		D	"Provide them with images of four non sequential parts and then child starts talking about the

	vocabularies	H	"He may find it difficult to understand and translate some words which makes him feel frustrated and may not complete the story"
		D	"give children list of simple words to use it on building their meaningful story"
	Interactive material or multimedia	A	"Interactive story-writing help the child build a story there may be a ready-made models make the child enters certain words" "Adding interactive elements such as audio and pictures"
	Brief gaming activity	A	"Game engine which give different scenarios when child written or chosen words"
		B	"Through games that he plays or who cares about playing"
		M	"it must be explained it with exercises"
	Reading stories	B	"If they are 9-11 years old by reading, we will draw their attention"
		H	"we may be able to attract children' attention by providing written or readable stories that can help the child to design their story"
		L	"Reading stories motivated child to write stories and affect on the quality of their stories"
Establishing relevant strategies	familiar t that children can recognise from their everyday live	A	"Without doubt if it was linked to his life would be easy to add his ideas"
		H	"If the story linked to child' life "
	Give children the choice to write a story	B	"Every child has different tendencies. I must make the child free to write what he likes" "It is necessary to determine the theme of the story to suit his tendencies"
	examples and presentations of successful work done by previous children	B	"Put children' names and their stories on the board as a reinforcement to show it in the classroom"
	Suitable for the children's	B	"Ask him to tell a story without dependence and know his level be the level of his age"

	level	L	"But the most important thing in the case of satisfaction and culture is the issue of dealing with the age group specifically what suits them"
	vocabularies that reflect the language of the children	D	"for example, if the story is realistic, his ability to retrieve the story is easy depending on the words he has and the linguistic stock that he has used"
		H	"He may find it difficult to understand and translate some words which makes him feel frustrated and may not complete the story"
		M	"The language must be simple and familiar for the child, and if he does not know the term, it must be explained it with exercises"
	Visual cues and symbolic thought that reflect values, knowledge and beliefs of a group of children	C	For example, we asked children to write about her favourite cartoon character and thee best friends of them and then they printed it out to be belong to them"
		J	" if he has a good background for this thing, he will write about it, but if not, then he should have a good background, so he can write it. For example, we put the characters of the children themselves within the story by their names to feel that they are heroes of the story"
Gaining Children's confidence	self-evaluation tool	C‹I	So, it great to give them feedback , comment or evaluate their work in digital way"
	challenging tasks	G	"ask them challenging work to give me more and produce more"
		C	"For example if there are challenges and competitions these the most important factor for satisfaction"
	frequent and varied activities	J	"In order to be the child active in writing process, the writing activities and reinforcement must be changed"
		L	"Confidence comes to the child by writing the story once, twice and three, and these come with special axes where it is repeated that leads to confidence"
	sufficient feedback	D	"Strengthen his confidence by using positive words and sufficient feedback"
		C‹I	"So, it great to give them feedback ---- in digital way"
	Give children a sense of independence	C	"If we ask children to write story from three line of course we cant enforce them to write"

Obtaining Children's satisfaction	praise for successful progress or accomplishment	A	"In reward principle, reward principle at the end of any completion of the work of a child will obtain the child' satisfaction"
	the schedule of reinforcements	H	"Provide verity reinforcement for children such as moral and physical gifts"
		B	"View their stories in a panel for some time with their names"
	Motivating feedback (praise) immediately following task performance	B	"Use the motivational words"
		D	"use positive words"
Teacher role	assess and evaluate children's work	C،I	"Some children are slow to write it may take a long time and the teacher does not have enough time in the class. So, it great to give them feedback , comment or evaluate their work in digital way"
	give feedback and comment	C،I	"Some children are slow to write it may take a long time and the teacher does not have enough time in the class. So, it great to give them feedback , comment or evaluate their work in digital way"
	reward students' work	L	"Teacher can design competitions to write stories and reward their stories"
	manage the number of students undertaking the activity	I,F	"The duration of the lesson is 45 minutes. So, it is difficult for teachers to control the stories of a large number of students.
	design and modify storytelling activities	D	"The role of the teacher is to guide children to the simple alternative words of or give children list of simple words to use it on building their meaningful story"
		I	"Writing the story can not be completed in a limited time 45 minutes. it must be fun and take time which could be designed by teacher. The teacher has a strong role and a strong influential factor child story"
		M	"The teacher himself can know the characteristics of the child at this stage, taking into account things in which the child, for example, the imagination or fear of certain things in the child. The creative

			teacher is able to employ the child's imagination and fear of certain things by writing stories"
	communicate electronically with colleagues, parents and children	B	"Social networking programs allow unrestricted timeline communication for the teacher"
	to share children's work with their parents	L	"The role of the teacher represents the role of the parents in enhancing the writing of the student. teacher can show the child story to their parent"
Class management system	a password-protected system	I	"Provide a safe environment for the child"
		B	"If the child felt safe and secure searching for his hobbies and tendencies and focused on them"
	creation of teams to accomplish a task	C	"The mates are also an influential factor because they are encouraged each other by collaboration or challenge" "As a group work the story may be written by more than a child"
	for developing smaller learning communities	I,F	"The duration of the lesson is 45 minutes. So, it is difficult for teachers to control the stories of a large number of students.
	all children to be recognised and rewarded	H	"The child is motivated to write. If parents notice, encourage and support the child's writing"
		D	"Writing stories must be shown to his parents and teacher then after he feels satisfaction and confidence and then he has the freedom to show their friends because the teacher and the people are the basis of safety"
Social presence	parents/relatives to recognise and reward their children's work	D	"Writing stories must be shown to his parents and teacher then after he feels satisfaction and confidence and then he has the freedom to show their friends because the teacher and the people are the basis of safety"

		H	“The child is motivated to write. If parents notice, encourage and support the child's writing”
	Children with notifications of peers’ achievements	C	“if the children notice his friend accomplish the work, they will be motivated to accomplish the work too”
	Collaborate with colleagues, teachers and parents	C	“The mates are also an influential factor because they are encouraged each other by collaboration or challenge” “As a group work the story may be written by more than a child”
Usability for Arabic language and Arab culture	write with diacritical marks	A	“ask them to write seven lines of story without diacritical marks and four lines with diacritical marks”
		B	“Some of the words may be passive. So, diacritical marks must be used to clarify the word sound and not to be confused for the reader of the story”
		C	“Can be settled as a positive point, for example, if children write stories with diacritical marks, they can get additional points of the basic point”
	Provides the ability to change the language setting to gender-specific language	C	“The user interface should be take into account both genders”
	Visual library that reflects Arab culture	A	“visual library about his culture because It is possible if the child lived in a desert environment and he is required to write about the South Pole, it would be difficult for him to write because he doesn’t know any details about it, unlike the desert environment”
Usability for children	gender-based differences	C	“For example, if we put a lot of topics about swimming or football and the subjects are subject to the concerns of both sexes”
		J	“the abilities and skills of girls are different from boys and different interests, how, for example, we

			bring one subject and merge between the parties as daughters or children".
	video-based help	A	"Provide the child of the steps for the creation of the story by using videos"
	funny, colourful, encouraging and entertaining content	K	"if the system is attractive to the child may become a new environment for them"
	easy and simple to use	A	"Makes the child not use the application or use it depend on to what extend the website can be complicated or easy"
		K	"the ease of use"
		M	"easy to use"
	Font easy to customise	A	"choose the preferred font and also reduce and enlarge the font size"
	uses animation and sound effects	A	"use possible animation, simple animation"
	customise the look of the personal avatar	A	" add personal avatar could be motivate children to use this websites"

Appendix E **Applying GQM Approach for generating items (English and Arabic Form)**

Factor	**Sustainable Requirements**
Elements	Obtaining children's attention (OCA)
Goal	Assessing the extent to which web-based tools has strategies for attracting children's attention before starting the activity of writing stories

Questions	Metrics
What are the strategies that can apply in web-based tools that attracting children's attention before starting the activity of writing stories?	1. The tool has visual representations, such as pictures
	2. The tool has different types of examples
	3. The tool has brainstorming and organising techniques such as storyboarding and story mapping
	4. The tool has various formats of storytelling, such as long form (more text, fewer images) and short form (more images, less text)
	5. The tool allows the addition of various topics
	6. The tool allows the addition of concrete vocabularies
	7. The tool allows the use of interactive materials or multimedia
	8. The tool involves a brief gaming activity
	9. The tool involves reading stories

Factor	**Sustainable Requirements**
Elements	Establishing children's Relevance (ECR)
Goal	Assessing the extent to which web-based tools has strategies relating to children's interests before starting the activity of writing stories.

Questions	Metrics
What are the strategies that can apply in web-based tools that relating to children's interests before starting the activity?	1. The tool has familiar tools for writing, erasing and moving objects
	2. The tool gives children the choice to write a story
	3. The tool has examples and presentations of successful work done by previous children
	4. The tool has activities suitable for the children's level
	5. The tool has vocabularies that reflect the language of the children

	6. The tool has visual cues and symbolic thought that reflect values, knowledge and beliefs of a group of children

Factor	**Sustainable Requirements**
Elements	Gaining Children's Confidence (GCC)
Goal	Assessing the extent to which web-based tools have confidence strategies that help children in terms of building up positive attitudes and expectancy toward success when writing stories.

Questions	Metrics
What are the strategies that can apply in web-based tools to help children in terms of building up positive attitudes and expectancy toward success when writing stories?	1. The tool has a self-evaluation tool
	2. The tool has challenging tasks
	3. The tool has frequent and varied activities
	4. The tool provides sufficient feedback
	5. The tool gives children a sense of independence
	6. The tool has a reading-to-writing model (starts with reading and then writing)

Factor	**Sustainable Requirements**
Elements	Obtaining Children's Satisfaction (OCS)
Goal	Assessing the extent to which web-based tools have satisfaction strategies that help children attain satisfactory feelings after carrying out the tasks of writing stories.

Questions	Metrics
What are the strategies that can apply in web-based tools to that help children attain satisfactory feelings after carrying out the task of writing stories?	1. The tool provides unexpected rewards for task performance
	2. The tool gives praise for successful progress or accomplishment
	3. The tool varies the schedule of reinforcements
	4. The tool provides motivating feedback (praise) immediately following task performance
	5. The tool provides selling options for children's stories

Factor	**Educational Requirements**
Elements	Teachers' Role (TER)

Goal	Assessing the extent to which web-based tools have features for teachers in terms of facilitating children's motivation to write stories.
Questions	Metrics
What are features that can apply in web-based tools to help teachers in children's motivation for writing stories?	1. The tool provides opportunities to assess and evaluate children's work
	2. The tool provides opportunities to give feedback and comment on children's work
	3. The tool provides opportunities to reward students' work
	4. The tool allows teachers to manage the number of students undertaking the activity
	5. The tool allows teachers to design storytelling activities
	6. The tool allows teachers to modify storytelling activities
	7. The tool allows teachers to communicate electronically with colleagues, parents and children
	8. The tool allows teachers to share children's work with their parents

Factor	**Educational Requirements**
Elements	Class Management System (CMS)
Goal	Assessing the extent to which web-based tools have features of class management system.
Questions	Metrics
What are the features that can apply in web-based tools to that help managing children for carrying out the task of writing stories?	1. The tool has a password-protected system to log in with different levels of authorities and functions
	2. The tool has a learning management system
	3. The tool allows the creation of teams to accomplish a task
	4. The tool allows for developing smaller learning communities
	5. The tool provides opportunities for all children to be recognised and rewarded
	6. The tool provides criteria for evaluation practices

Factor	**Educational Requirements**
Elements	***Social presence (SOP)***
Goal	Assessing the extent to which web-based tools have features to deliver a sense of connection with others.

Questions	Metrics
What are the features that can apply in web-based tools to deliver a sense of connection with other when carrying out the task of writing stories?	1. The tool allows parents/relatives to recognise and reward their children's work
	2. The tool allows child to safely use various communication and discussion tools with colleagues, parents, and teachers
	3. The tool allows children to share and gift rewards to other students
	4. The tool has social rewards, such as "like" buttons and other incentives
	5. The tool provides the children with notifications of peers' achievements
	6. The tool helps the children to collaborate with colleagues, teachers and parents

Factor	**Technical Requirements**
Elements	*Usability for Arabic Users (UAU)*
Goal	Assessing the extent to which web-based tools has user interface that support the cultural requirements for Arab users.

Questions	Metrics
What are the cultural requirements to design user interface for Arab users that help children carrying out the task of writing stories?	1. The tool supports the direction of writing from right to left for text
	2. The tool supports the direction of writing from right to left for numbers
	3. The tool allows users to write with diacritical marks
	4. The tool supports a right to left user interface
	5. The tool provides the ability to change the language setting to gender-specific language
	6. The tool uses understandable literal icons and directional images that reflect the purpose in Saudi culture
	7. The tool has visual library that reflects Saudi culture such as Saudi clothes, traditional food, and holy sites in Islam

Factor	**Technical Requirements**
Elements	Usability for children (UCH)
Goal	Assessing the extent to which the user interface of web tool is easy to use by children.

Questions	Metrics
What are the user interface	1. The user interface takes into account gender-based differences

specifications for children that help children to easy to use the web tool for carrying out the task of writing stories?	2. The tool use video-based help
	3. The user interface uses funny, colourful, encouraging and entertaining content
	4. The design of the user interface is easy and simple to use
	5. The fonts (style, colour) in the tool are easy to customise
	6. The user interface uses animation and sound effects
	7. The user interface has a clear and consistent navigation
	8. The user interface uses clear understandable icons
	9. The tool allows users to customize the look of the personal avatar

Appendix F **The Instrument SETchecklist After Applying GQM approach (English and Arabic Form)**

Elements: Obtaining children's attention (OCA)

The extent to which web-based tools has strategies for attracting children's attention before starting the activity of writing stories

تقييم استراتيجيات جذب انتباه الأطفال قبل بدء نشاط كتابة القصص الإلكترونية في أدوات القص،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
OCA1	The tool has visual representations, such as pictures before starting the storytelling activity في الأداة تمثيلات بصرية، كالصور على سبيل المثال.					
OCA2	The tool has different types of examples الأداة فيها أنواع مختلفة من الأمثلة.					
OCA3	The tool has brainstorming and organising techniques such as storyboarding and story mapping before starting the storytelling activity الأداة تتوفر فيها تقنيات العصف ذهني والآليات التنظيمية، مثل تصوير القصص وتخطيط القصة.					
OCA4	The tool has various formats of storytelling, such as long form (more text, fewer images) and short form (more images, less text) لأداة لديها أشكال مختلفة من القص، مثل الشكل الكامل (أن يكون المحتوى النصي أكثر والصور أقل) والشكل المختصر (أن يكون هناك صور أكثر والمحتوى النصي أقل).					
OCA5	The tool allows the addition of various topics تسمح الأداة بإضافة مواضيع مختلفة.					
OCA6	The tool allows the addition of concrete vocabularies to prompt student to write تسمح الأداة بإضافة مفردات ملموسة.					
OCA7	The tool allows the use of interactive materials or multimedia تسمح الأداة باستخدام المواد التفاعلية أو الوسائط المتعددة.					
OCA8	The tool involves a brief gaming activity تتضمن الأداة نشاطا موجزا للألعاب .					
OCA9	The tool involves reading stories تتضمن الأداة قراءة القصص.					

Elements: Establishing children's Relevance (ECR)

The extent to which web-based tools have strategies relating to children's interests before starting the activity of writing stories.

تقييم الاستراتيجيات المتعلقة باهتمامات الأطفال قبل بدء نشاط كتابة القصص الإلكترونية في أدوات القص

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
ECR1	The tool has familiar tools for writing, erasing and moving objects لأداة لديها أدوات مألوفة لكتابة، ومحو وتحريك الأشياء.					
ECR2	The tool gives children the choice to write a story الأداة تعطي الأطفال الخيار لكتابة قصة.					
ECR3	The tool has examples and presentations of successful work done by previous children تحتوي الأداة على أمثلة وعروض عن أعمال ناجحة كان قد قام بها أطفال سابقون.					
ECR4	The tool has activities suitable for the children's level الأداة فيها أنشطة مناسبة لمستوى الأطفال.					
ECR5	The tool has vocabularies that reflect the language of the children الأداة تحتوي على مفردات تعكس لغة الأطفال.					
ECR6	The tool has visual cues and symbolic thought that reflect values, knowledge and beliefs of a group of children الأداة فيها إشارات بصرية وفكر رمزي يعكس القيم والمعارف والمعتقدات الخاصة بمجموعة من الأطفال					

Element: Gaining Children's Confidence (GCC)

The extent to which web-based tools have confidence strategies that helps children in terms of building up positive attitudes and expectancy toward success when writing stories.

تقييم استراتيجيات الثقة بالنفس التي تساعد الأطفال قبل بدء نشاط كتابة القصص الإلكترونية في أدوات القص،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
GCC1	The tool has a self-evaluation tool الأداة فيها آلية للتقييم الذاتي.					
GCC2	The tool has challenging tasks الأداة تحتوي على أنشطة صعبة.					
GCC3	The tool has frequent and varied activities الأداة فيها أنشطة متكررة ومتنوعة.					
GCC4	The tool provides sufficient feedback توفر الأداة تغذية رجعية كافية.					
GCC5	The tool gives children a sense of independence such as within self evaluation and easy access without guidance الأداة تجعل الأطفال يشعرون بالاستقلالية.					
GCC6	The tool has a reading-to-writing model (starts with reading and then writing) تحتوي الأداة على نموذج "من القراءة إلى					

	الكتابة" (يبدأ بالقراءة ثم الكتابة).					

Element: Obtaining Children's Satisfaction (OCS)

The extent to which web-based tools have satisfaction strategies to help children attain satisfactory feelings after carrying out the tasks of writing stories.

تقييم الاستراتيجيات التي تساعد الأطفال على الشعور بالرضا بعد الانتهاء من أنشطة كتابة القصص الإلكترونية في أدوات القص،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
OCS1	The tool provides unexpected rewards for task performance توفر الأداة مكافآت غير متوقعة لأداء النشاط.					
OCS2	The tool gives praise for successful progress or accomplishment تثني الأداة على أي تقدم أو إنجاز ناجح.					
OCS3	The tool varies the schedule of reinforcements تقدم الأداة قائمة مُدعّمات متنوعة.					
OCS4	The tool provides motivating feedback (praise) immediately following task performance توفر الأداة تغذية رجعية محفزة (ثناء) فور الانتهاء من النشاط.					
OCS5	The tool provides selling options for children's stories توفر الأداة خيار البيع لقصص الأطفال.					

Element: Teachers' Role (TER)

The extent to which web-based tools have features for teachers in terms of facilitating children's motivation to write stories.

تقييم خيارات المعلمين فيما يتعلق بتسهيل عملية تحفيز الأطفال على كتابة القصص الإلكترونية في أدوات القص،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
TER1	The tool provides opportunities to assess and evaluate children's work توفر الأداة فرصا لتقييم وتقويم عمل الأطفال.					
TER2	The tool provides opportunities to give feedback and comment on children's work توفر الأداة فرصا لإبداء الرأي (التغذية الرجعية) والتعليق على عمل الأطفال.					
TER3	The tool provides opportunities to reward students' work توفر هذه الأداة فرصا لمكافأة عمل الطلاب.					
TER5	The tool allows teachers to design storytelling activities تسمح هذه الأداة للمعلمين بتصميم أنشطة سرد القصص.					
TER6	The tool allows teachers to modify storytelling activities تسمح هذه الأداة للمعلمين بتعديل أنشطة سرد القصص.					
TER7	The tool allows teachers to communicate electronically with colleagues, parents and children for example teacher awareness of					

	different learning styles/methods such as dyslexia and autism تسمح هذه الأداة للمعلمين بالاتصال إلكترونيا مع الزملاء وأولياء الأمور والأطفال.					
TER8	The tool allows teachers to share children's work with their parents تسمح هذه الأداة للمعلمين بإشراك الأولياء في عمل الأطفال.					

Element: Class Management System (CMS)

The extent to which web-based tools have features of class management system.

لاي مدى الاداة الالكترونيه تمتلك مميزات لتنظيم الطلاب إلكترونيا حتى يتسنى لهم كتابة القصص الإلكترونية، وهذا من وجهة نظر المعلمين.

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
CMS1	The tool has a password-protected system to log in with different levels of authorities and functions الأداة فيها نظام محمي بكلمة مرور لتسجيل الدخول بمستويات مختلفة من السلطات والوظائف.					
CMS2	The tool has a learning management system في الأداة نظام لإدارة التعلم.					
CMS3	The tool allows the creation of teams to accomplish a task تسمح الأداة بإنشاء مجموعات لإنجاز الأنشطة.					
CMS4	The tool allows for developing smaller learning communities تسمح الأداة بإنشاء مجتمعات تعلم صغيرة.					
CMS5	The tool provides opportunities for all children to be recognised and rewarded توفر هذه الأداة فرصا لجميع الأطفال للتعرف عليهم ومكافأتهم.					
CMS6	The tool provides criteria for evaluation practices توفر الأداة مقاييس معينة لممارسات التقويم.					

Element: Social presence (SOP)

The extent to which web-based tools have features to deliver a sense of connection with others.

تقييم مدى احتواء أدوات القص على ميزات تساعد على تحقيق نوع من التواصل والارتباط بالآخرين.

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
SOP1	The tool allows parents/relatives to recognise and reward their children's work تسمح الأداة للآباء والأقارب بالتعرف على عمل أطفالهم ومكافأتهم.					
SOP2	The tool allows child to safely use various communication and discussion tools with colleagues, parents, and teachers تسمح الأداة للأطفال بالاستخدام الآمن لأدوات الاتصال والمناقشة المختلفة مع الزملاء وأولياء الأمور والمعلمين					
SOP3	The tool allows children to share and gift rewards to other students					

SOP4	The tool has social rewards, such as “like” buttons and other incentives الأداة فيها مكافآت اجتماعية، مثل زر "أعجبني" وغيرها من الحوافز.					
SOP5	The tool provides the children with notifications of peers’ achievements توفر الأداة للأطفال إخطارات بإنجازات أقرانهم.					
SOP6	The tool helps the children to collaborate with colleagues, teachers and parents الأداة تساعد الأطفال على التعاون مع الزملاء والمعلمين والآباء.					

Element: ***Usability for Arabic Users (UAU)***

The extent to which web-based tools has user interface that support the cultural requirements for Arab users.

تقييم مدى استجابة أدوات رواية القصص للمتطلبات الثقافية للمستخدمين العرب وخصوصا منهم المستخدمين السعوديين لكتابة القصص الإلكترونية،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
UAC1	The tool supports the direction of writing from right to left for text تدعم الأداة اتجاه الكتابة في النص من اليمين إلى اليسار.					
UAC2	The tool supports the direction of writing from right to left for numbers تدعم الأداة اتجاه كتابة الأرقام من اليمين إلى اليسار.					
UAC3	The tool allows users to write with diacritical marks تمكن الأداة المستخدمين من الكتابة بعلامات التشكيل.					
UAC4	The tool supports a right to left user interface تدعم الأداة واجهة مستخدم من اليمين إلى اليسار.					
UAC5	The tool provides the ability to change the language setting to gender-specific language إعدادات اللغة حتى تتضمن لغة خاصة بجنس معين					
UAC6	The tool uses understandable literal icons and directional images that reflect the purpose in Saudi culture تستخدم الأداة الرموز الحرفية المفهومة والصور الاتجاهية التي تعكس الغرض في الثقافة السعودية					
UAC7	The tool has visual library that reflects Saudi culture such as Saudi clothes, traditional food, and holy sites in Islam تحتوي هذه الأداة على مكتبة مرئية تعكس الثقافة السعودية كالملابس السعودية والأغذية التقليدية والأماكن المقدسة في الإسلام.					

Element: Usability for children (UCH)

The extent to which the user interfaces of web tool is easy to use by children.

تقييم مدى سهولة استخدام أدوات القص من قبل الأطفال لغرض كتابة القصص الإلكترونية،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
UCH1	The user interface takes into account gender-based differences to customise their preferences تأخذ واجهة المستخدم في الاعتبار الاختلافات القائمة على نوع الجنس					
UCH2	The tool use video-based help تستخدم الأداة المساعدة المعتمدة على الفيديو.					
UCH3	The user interface uses funny, colourful, encouraging and entertaining content تستخدم واجهة المستخدم محتوى مضحكا وملونا ومشجعا وترفيهيا.					
UCH4	The design of the user interface is easy and simple to use تصميم واجهة المستخدم بسيط وسهل الاستخدام.					
UCH5	The fonts (style, colour) in the tool are easy to customise يمكن تخصيص الخطوط (النسق واللون) في الأداة بسهولة.					
UCH6	The user interface uses animation and sound effects يستخدم واجهة المستخدم الرسوم المتحركة والمؤثرات الصوتية					
UCH7	The user interface has a clear and consistent navigation واجهة المستخدم لديها آلية إبحار واضحة ومتسقة.					
UCH8	The user interface uses clear understandable icons تستخدم واجهة المستخدم ايقونات واضحة مفهومة.					
UCH9	The tool allows users to customise the look of the personal avatar الأداة تسمح للمستخدمين بتخصيص مظهر الشخصية الرمزية.					

Appendix G**Evaluation document for the purpose of content validity**

PREAMBLE: NOTE TO EXPERTS FOR EVALUATION PURPOSES

Dear Sir/Madam

This document is referred to the '**Evaluation Document**'.
You have also been provided with a document referred to as the '**SETcl Questionnaire**'.
You have been provided with these documents because you are an expert in the field.

Please evaluate the **SETcl Questionnaire** using the evaluation criteria.
There are 2 parts to the evaluation: the evaluation of the questions, and the evaluation of the scale.
The questions and the scale each have their own different criteria for evaluation.

In the Evaluation Document, the evaluation criteria appear in blue and green.
The evaluation criteria for the questions appears in the blue area.
The evaluation criteria for the scale appears in the green area.
This evaluation is to get the understanding whether the questions are necessary or not and whether the scales appropriately measuring the question or not.

Thank you for your cooperation. Your help is greatly appreciated.
Yours sincerely
Mashael Asiri

This section explains and defines the evaluation criteria for the questions (blue) and the scale (green).

Evaluation Criteria of the Questions	**Definition**
Necessary	The question is essential to describe the motivational requirements for children in web Story-writing Tools. It must be included and its absence would be detrimental.
Neither necessary nor unnecessary	The question may be useful but NOT essential to describe the motivational requirements for children in in web Story-writing Tools.
Unnecessary	The question is NOT necessary to describe the motivational requirements for children in web Story-writing Tools. Its absence would not affect the motivational requirements for children in web Story-writing Tools.

Evaluation Criteria of the Scale	**Definition**
Appropriate	The scale is appropriate to measure the questions in SETcl. It indicates that the scale will significantly affect the question.
Neither appropriate nor inappropriate	The scale is neither appropriate nor inappropriate to measure the questions in SETcl.
Inappropriate	The scale is inappropriate to measure the questions in SETcl. It indicates that the scales will not significantly affect the question.

Here the term 'questions' and the term 'scale' refers to the questions and the scales used in the SETcl Questionnaire document.

This table consists of The Motivational Requirements for children, the questions number for each requirement and the evaluation criteria. The questions number for each requirement referred to the same number and the same requirement in the sustainable Educational Technical Checklist (SETcl) Questionnaire.
Please evaluate the question by placing a tick (✓) in the appropriate part of the evaluation criteria.

Requirements	**Questions**	**Evaluation Criteria of the Questions**	**Evaluation Criteria of the Scale**

		Necessary	Neither necessary nor unnecessary	Not necessary	Appropriate	Neither appropriate nor inappropriate	Inappropriate
Obtaining children's Attention (OCA)	**OCA1**						
	OCA2						
	OCA3						
	OCA4						
	OCA5						
	OCA6						
	OCA7						
	OCA8						
	OCA9						
	OCA10						
Comment or suggestion about the questions and the scales							
Establishing Children's Relevance(ECR)	**ECR1**						
	ECR2						
	ECR3						
	ECR4						
	ECR5						
	ECR6						
	ECR7						
Comment or suggestion about the questions and the scales							
Gaining Children's confidence (GCC)	**GCC1**						
	GCC2						
	GCC3						
	GCC4						
	GCC5						
	GCC6						
comment or suggestion about the questions and the scales							

Requirements	**Questions**	**Evaluation Criteria of the Questions**			**Evaluation Criteria of the Scale**		
		1	**2**	**3**	**1**	**2**	**3**
		Necessary	**Neither necessary nor unnecessary**	**Not necessary**	**Appropriate**	**Neither appropriate nor inappropriate**	**Inappropriate**
Obtaining children's satisfaction (OCS)	**OCS1**						
	OCS2						

	OCS3						
	OCS4						
	OCS5						
Comment or suggestion about the questions and the scales							
	TER1						
	TER2						
	TER3						
	TER4						
	TER5						
	TER6						
	TER7						
	TER8						
Comment or suggestion about the questions and the scales							
Class Managment Syetem (SC)	**SC1**						
	SC2						
	SC3						
	SC4						
	SC5						
	SC6						
	SC7						
Comment or suggestion about the questions and the scales							
Social Presence (SP)	**SP1**						
	SP2						
	SP3						
	SP4						
	SP5						
	SP6						
	SP7						
	SP8						
	SP9						
	SP10						
Comment or suggestion about the questions and the scales							

Elements		**Evaluation Criteria of the Questions**			**Evaluation Criteria of the Scale**		
		1	**2**	**3**	**1**	**2**	**3**
	Questions	**Necessary**	**Neither necessary nor unnecessary**	**Not necessary**	**Appropriate**	**Neither appropriate nor inappropriate**	**Inappropriate**
Usability for Arabic	**UAL1**						

Language (UAL)	**UAL2**						
	UAL3						
	UAL4						
	UAL5						
	UAL6						
	UAL7						
Comment or suggestion about the questions and the scales							
Usability for Children (UC)	**UC1**						
	UC2						
	UC3						
	UC4						
	UC5						
	UC6						
	UC7						
	UC8						
	UC9						
	UC10						
Comment or suggestion about the questions and the scales							

Do you have any comment or suggestion about the questions and the scales?

Comment/Suggestion;

Thank you very much for completing this evaluation document. Your answers will be useful to the development of this study.

Appendix H**The Instrument Items based on the result of the content validity ratio (CVR)**

THE ITEM IS HIGHLIGHTED BY YELLOW COLOUR TO CLARIFY THE ITEMS AFTER PARTICIPANTS' SUGGESTIONS AND THE ITEMS THAT HIGHLIGHTED BY THE RED COLOUR ARE DELETED BASED ON THE RESULT OF THE CONTENT VALIDITY RATIO

Item code	Statements/Questions
OCA1	The tool has visual representations, such as pictures before starting the storytelling activity
OCA2	The tool has different types of examples
OCA3	The tool has brainstorming and organising techniques such as storyboarding and story mapping before starting the storytelling activity
OCA4	The tool has various formats of storytelling, such as long form (more text, fewer images) and short form (more images, less text)
OCA5	The tool allows the addition of various topics
OCA6	The tool allows the addition of concrete vocabularies to prompt student to write
OCA7	The tool allows the use of interactive materials or multimedia
OCA8	The tool involves a brief gaming activity
OCA9	The tool involves reading stories
ECR1	The tool has familiar tools for writing, erasing and moving objects
ECR2	The tool gives children the choice to write a story
ECR3	The tool has examples and presentations of successful work done by previous children
ECR4	The tool has activities suitable for the children's level
ECR5	The tool has vocabularies that reflect the language of the children
ECR6	The tool has visual cues and symbolic thought that reflect values, knowledge and beliefs of a group of children
GCC1	The tool has a self-evaluation tool
GCC2	The tool has challenging tasks
GCC3	The tool has frequent and varied activities
GCC4	The tool provides sufficient feedback
GCC5	The tool gives children a sense of independence such as within self evaluation and easy access without guidance
GCC6	The tool has a reading-to-writing model (starts with reading and then writing)
OCS1	The tool provides unexpected rewards for task performance
OCS2	The tool gives praise for successful progress or accomplishment
OCS3	The tool varies the schedule of reinforcements
OCS4	The tool provides motivating feedback (praise) immediately following task performance
OCS5	The tool provides selling options for children's stories
TER1	The tool provides opportunities to assess and evaluate children's work
TER2	The tool provides opportunities to give feedback and comment on children's work
TER3	The tool provides opportunities to reward students' work
TER4	The tool allows teachers to manage the number of students undertaking the activity
TER5	The tool allows teachers to design storytelling activities
TER6	The tool allows teachers to modify storytelling activities
TER7	The tool allows teachers to communicate electronically with colleagues, parents and children for

	example teacher awareness of different learning styles/methods such as dyslexia and autism
TER8	The tool allows teachers to share children's work with their parents
CMS1	The tool has a password-protected system to log in with different levels of authorities and functions
CMS2	The tool has a learning management system
CMS3	The tool allows the creation of teams to accomplish a task
CMS4	The tool allows for developing smaller learning communities
CMS5	The tool provides opportunities for all children to be recognised and rewarded
CMS6	The tool provides criteria for evaluation practices
SOP1	The tool allows parents/relatives to recognise and reward their children's work
SOP2	The tool allows child to safely use various communication and discussion tools with colleagues, parents, and teachers
SOP3	The tool allows children to share and gift rewards to other students
SOP4	The tool has social rewards, such as "like" buttons and other incentives
SOP5	The tool provides the children with notifications of peers' achievements
SOP6	The tool helps the children to collaborate with colleagues, teachers and parents
UAC1	The tool supports the direction of writing from right to left for text
UAC2	The tool supports the direction of writing from right to left for numbers
UAC3	The tool allows users to write with diacritical marks
UAC4	The tool supports a right to left user interface
UAC5	The tool provides the ability to change the language setting to gender-specific language
UAC6	The tool uses understandable literal icons and directional images that reflect the purpose in Saudi culture
UAC7	The tool has visual library that reflects Saudi culture such as Saudi clothes, traditional food, and holy sites in Islam
UCH1	The user interface takes into account gender-based differences to customise their preferences
UCH2	The tool use video-based help
UCH3	The user interface uses funny, colourful, encouraging and entertaining content
UCH4	The design of the user interface is easy and simple to use
UCH5	The fonts (style, colour) in the tool are easy to customise
UCH6	The user interface uses animation and sound effects
UCH7	The user interface has a clear and consistent navigation
UCH8	The user interface uses clear understandable icons
UCH9	The tool allows users to customise the look of the personal avatar

Appendix I **The instrument (SET checklist) after Content Validity in Arabic and English form**

Elements: Obtaining children's attention (OCA)

The extent to which web-based tools has strategies for attracting children's attention before starting the activity of writing stories

تقييم استراتيجيات جذب انتباه الأطفال قبل بدء نشاط كتابة القصص الإلكترونية في أدوات القص،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
OCA1	The tool has visual representations, such as pictures before starting the storytelling activity في الأداة تمثيلات بصرية، كالصور على سبيل المثال.					
OCA2	The tool has different types of examples الأداة فيها أنواع مختلفة من الأمثلة.					
OCA3	The tool has brainstorming and organising techniques such as storyboarding and story mapping before starting the storytelling activity الأداة تتوفر فيها تقنيات العصف ذهني والآليات التنظيمية، مثل تصوير القصص وتخطيط القصة.					
OCA4	The tool has various formats of storytelling, such as long form (more text, fewer images) and short form (more images, less text) لأداة لديها أشكال مختلفة من القص، مثل الشكل الكامل (أن يكون المحتوى النصي أكثر والصور أقل) والشكل المختصر (أن يكون هناك صور أكثر والمحتوى النصي أقل).					
OCA5	The tool allows the addition of various topics تسمح الأداة بإضافة مواضيع مختلفة.					
OCA6	The tool allows the addition of concrete vocabularies to prompt student to write تسمح الأداة بإضافة مفردات ملموسة.					
OCA7	The tool allows the use of interactive materials or multimedia تسمح الأداة باستخدام المواد التفاعلية أو الوسائط المتعددة.					
OCA8	The tool involves a brief gaming activity تتضمن الأداة نشاطا موجزا للألعاب .					

Elements: Establishing children's Relevance (ECR)

The extent to which web-based tools have strategies relating to children's interests before starting the activity of writing stories.

تقييم الاستراتيجيات المتعلقة باهتمامات الأطفال قبل بدء نشاط كتابة القصص الإلكترونية في أدوات القص

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly	Agree	Neutral	Disagree	Strongly

		agree				Disagree
ECR2	The tool gives children the choice to write a story الأداة تعطي الأطفال الخيار لكتابة قصة.					
ECR4	The tool has activities suitable for the children's level الأداة فيها أنشطة مناسبة لمستوى الأطفال.					
ECR5	The tool has vocabularies that reflect the language of the children الأداة تحتوي على مفردات تعكس لغة الأطفال.					
ECR6	The tool has visual cues and symbolic thought that reflect values, knowledge and beliefs of a group of children الأداة فيها إشارات بصرية وفكر رمزي يعكس القيم والمعارف والمعتقدات الخاصة بمجموعة من الأطفال					

Element: Gaining Children's Confidence (GCC)

The extent to which web-based tools have confidence strategies that helps children in terms of building up positive attitudes and expectancy toward success when writing stories.

تقييم استراتيجيات الثقة بالنفس التي تساعد الأطفال قبل بدء نشاط كتابة القصص الإلكترونية في أدوات القص،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
GCC2	The tool has challenging tasks الأداة تحتوي على أنشطة صعبة.					
GCC3	The tool has frequent and varied activities الأداة فيها أنشطة متكررة ومتنوعة.					
GCC5	The tool gives children a sense of independence such as within self evaluation and easy access without guidance الأداة تجعل الأطفال يشعرون بالاستقلالية.					

Element: Obtaining Children's Satisfaction (OCS)

The extent to which web-based tools have satisfaction strategies to help children attain satisfactory feelings after carrying out the tasks of writing stories.

تقييم الاستراتيجيات التي تساعد الأطفال على الشعور بالرضا بعد الانتهاء من أنشطة كتابة القصص الإلكترونية في أدوات القص،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
OCS2	The tool gives praise for successful progress or accomplishment تثني الأداة على أي تقدم أو إنجاز ناجح.					
OCS3	The tool varies the schedule of reinforcements تقدم الأداة قائمة مُدعّمات متنوعة.					
OCS4	The tool provides motivating feedback (praise) immediately following task performance توفر الأداة تغذية رجعية محفزة (ثناء) فور الانتهاء من النشاط.					

Element: Teachers' Role (TER)

The extent to which web-based tools have features for teachers in terms of facilitating children's motivation to write stories.

تقييم خيارات المعلمين فيما يتعلق بتسهيل عملية تحفيز الأطفال على كتابة القصص الإلكترونية في أدوات القص،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
TER2	The tool provides opportunities to give feedback and comment on children's work توفر الأداة فرصا لإبداء الرأي (التغذية الرجعية) والتعليق على عمل الأطفال.					
TER3	The tool provides opportunities to reward students' work توفر هذه الأداة فرصا لمكافأة عمل الطلاب.					
TER5	The tool allows teachers to design storytelling activities تسمح هذه الأداة للمعلمين بتصميم أنشطة سرد القصص.					
TER6	The tool allows teachers to modify storytelling activities تسمح هذه الأداة للمعلمين بتعديل أنشطة سرد القصص.					
TER7	The tool allows teachers to communicate electronically with colleagues, parents and children for example teacher awareness of different learning styles/methods such as dyslexia and autism تسمح هذه الأداة للمعلمين بالاتصال إلكترونيا مع الزملاء وأولياء الأمور والأطفال.					
TER8	The tool allows teachers to share children's work with their parents تسمح هذه الأداة للمعلمين بإشراك الأولياء في عمل الأطفال.					

Element: Class Management System (CMS)

The extent to which web-based tools have features of class management system.

لاي مدى الاداة الالكترونيه تمتلك مميزات لتنظيم الطلاب إلكترونيا حتى يتسنى لهم كتابة القصص الإلكترونية، وهذا من وجهة نظر المعلمين.

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
CMS1	The tool has a password-protected system to log in with different levels of authorities and functions الأداة فيها نظام محمي بكلمة مرور لتسجيل الدخول بمستويات مختلفة من السلطات والوظائف.					
CMS2	The tool has a learning management system في الأداة نظام لإدارة التعلم.					
CMS3	The tool allows the creation of teams to accomplish a task تسمح الأداة بإنشاء مجموعات لإنجاز الأنشطة.					
CMS4	The tool allows for developing smaller learning communities تسمح الأداة بإنشاء مجتمعات تعلم صغيرة.					
CMS6	The tool provides criteria for evaluation practices توفر الأداة مقاييس معينة لممارسات التقويم.					

Element: Social presence (SOP)

The extent to which web-based tools have features to deliver a sense of connection with

others.

تقييم مدى احتواء أدوات القص على ميزات تساعد على تحقيق نوع من التواصل والارتباط بالآخرين.

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
SOP1	The tool allows parents/relatives to recognise and reward their children's work تسمح الأداة للآباء والأقارب بالتعرف على عمل أطفالهم ومكافأتهم.					
SOP2	The tool allows child to safely use various communication and discussion tools with colleagues, parents, and teachers تسمح الأداة للأطفال بالاستخدام الآمن لأدوات الاتصال والمناقشة المختلفة مع الزملاء وأولياء الأمور والمعلمين					
SOP4	The tool has social rewards, such as "like" buttons and other incentives الأداة فيها مكافآت اجتماعية، مثل زر "أعجبني" وغيرها من الحوافز.					
SOP6	The tool helps the children to collaborate with colleagues, teachers and parents الأداة تساعد الأطفال على التعاون مع الزملاء والمعلمين والآباء.					

Element: ***Usability for Arabic Users (UAU)***

The extent to which web-based tools has user interface that support the cultural requirements for Arab users.

تقييم مدى استجابة أدوات رواية القصص للمتطلبات الثقافية للمستخدمين العرب وخصوصا منهم المستخدمين السعوديين لكتابة القصص الإلكترونية،

Item code	Statements/Questions	Scale (Please tick ✓ once per question)				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
UAC1	The tool supports the direction of writing from right to left for text تدعم الأداة اتجاه الكتابة في النص من اليمين إلى اليسار.					
UAC2	The tool supports the direction of writing from right to left for numbers تدعم الأداة اتجاه كتابة الأرقام من اليمين إلى اليسار.					
UAC3	The tool allows users to write with diacritical marks تمكن الأداة المستخدمين من الكتابة بعلامات التشكيل.					
UAC4	The tool supports a right to left user interface تدعم الأداة واجهة مستخدم من اليمين إلى اليسار.					
UAC5	The tool provides the ability to change the language setting to gender-specific language إعدادات اللغة حتى تتضمن لغة خاصة بجنس معين					
UAC6	The tool uses understandable literal icons and directional images that reflect the purpose in Saudi culture					

	تستخدم الأداة الرموز الحرفية المفهومة والصور الاتجاهية التي تعكس الغرض في الثقافة السعودية					
UAC7	The tool has visual library that reflects Saudi culture such as Saudi clothes, traditional food, and holy sites in Islam تحتوي هذه الأداة على مكتبة مرئية تعكس الثقافة السعودية كالملابس السعودية والأغذية التقليدية والأماكن المقدسة في الإسلام.					

Element: Usability for children (UCH)

The extent to which the user interfaces of web tool is easy to use by children.

تقييم مدى سهولة استخدام أدوات القص من قبل الأطفال لغرض كتابة القصص الإلكترونية،

Item code	**Statements/Questions**	**Scale (Please tick ✓ once per question)**				
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
UCH1	The user interface takes into account gender-based differences to customise their preferences تأخذ واجهة المستخدم في الاعتبار الاختلافات القائمة على نوع الجنس					
UCH2	The tool use video-based help تستخدم الأداة المساعدة المعتمدة على الفيديو.					
UCH3	The user interface uses funny, colourful, encouraging and entertaining content تستخدم واجهة المستخدم محتوى مضحكا وملونا ومشجعا وترفيهيا.					
UCH4	The design of the user interface is easy and simple to use تصميم واجهة المستخدم بسيط وسهل الاستخدام.					
UCH5	The fonts (style, colour) in the tool are easy to customise يمكن تخصيص الخطوط (النسق واللون) في الأداة بسهولة.					
UCH6	The user interface uses animation and sound effects يستخدم واجهة المستخدم الرسوم المتحركة والمؤثرات الصوتية					
UCH7	The user interface has a clear and consistent navigation واجهة المستخدم لديها آلية إبحار واضحة ومتسقة.					
UCH8	The user interface uses clear understandable icons تستخدم واجهة المستخدم ايقونات واضحة مفهومة.					
UCH9	The tool allows users to customise the look of the personal avatar الأداة تسمح للمستخدمين بتخصيص مظهر الشخصية الرمزية.					

Appendix J **Participants Material for experimental validation**

J.1 The Items availability in the tools along with the Task ID in the Designed Prototypes

J.2 participant information sheet

J.3 The lists of experimental activities

J.4 Experimental Prototypes

J.1 The Items availability in the tools along with the Task ID in the Designed Prototypes

Item code	Statements/Questions	storybird	alefbata	anasworld	mishkal	Task ID in the Designed Prototypes
		(✓) refer to the availability of this item in the tool				
OCA1	The tool has visual representations, such as pictures before starting the storytelling activity	✓				Prototype one (Task C)
OCA2	The tool has different types of examples	✓				Prototype one (Task B)
OCA3	The tool has brainstorming and organising techniques such as storyboarding and story mapping before starting the storytelling activity	✓				Prototype one (Task C)
OCA4	The tool has various formats of storytelling, such as long form (more text, fewer images) and short form (more images, less text)	✓				Prototype one (Task C)
OCA5	The tool allows the addition of various topics	✓				Prototype one (Task C or Task K)
OCA6	The tool allows the addition of concrete vocabularies to prompt student to write	✓				Prototype one Task K
OCA7	The tool allows the use of interactive materials or multimedia		✓			Prototype two Task F
OCA8	The tool involves a brief gaming activity		✓			Prototype two Task F
ECR2	The tool gives children the choice to write a story in any way	✓				Prototype one (Task C)
ECR4	The tool has activities suitable for the children's level	✓				Prototype one

GCC2	The tool has challenging tasks	✓				Prototype one (Task D.2)
GCC3	The tool has frequent and varied activities	✓				Prototype one (Task C)
GCC5	The tool gives children a sense of independence such as within self evaluation and easy access without guidance	✓				Prototype one (Task B & C)
OCS2	The tool gives praise for successful progress or accomplishment	✓				Prototype one (Task C and E)
OCS3	The tool varies the schedule of reinforcements	✓				Prototype one (Task E)
OCS4	The tool provides motivating feedback (praise) immediately following task performance	✓				Prototype one (Task C)
TER2	The tool provides teachers the opportunities to give feedback and comment on children's work	✓				Prototype one (Task L)
TER3	The tool provides teachers opportunities to reward students' work	✓				Prototype one (Task L)
TER5	The tool allows teachers to design storytelling activities	✓				Prototype one (Task K)
TER6	The tool allows teachers to modify storytelling activities	✓				Prototype one (Task K)
TER7	The tool allows teachers to communicate electronically with colleagues, parents and children	✓				Prototype one (Task K)
TER8	The tool allows teachers to share children's work with their parents	✓				Prototype one (Task K)
CMS1	The tool has a password-protected system to log in with different levels of authorities and functions	✓				Prototype one (Task A & J)
CMS2	The tool has a learning management system	✓				Prototype one (Task I,J,K,L)
CMS3	The tool allows the creation of teams to accomplish a task	✓				Prototype one (Task J or D.1)
CMS4	The tool allows for developing smaller learning communities	✓				Prototype one (Task J)

CMS6	The tool provides criteria for evaluation practices	✓				Prototype one (Task L)
SOP1	The tool allows parents/relatives to recognise and reward their children's work	✓				Prototype one (Task M)
SOP2	The tool allows child to safely use various communication and discussion tools with colleagues, parents, and teachers	✓				Prototype one (Task M)
SOP4	The tool has social rewards, such as "like" buttons and other incentives	✓				Prototype one (Task M)
SOP6	The tool helps the children to collaborate with colleagues, teachers and parents	✓				Prototype one (Task D.1)
UAU1	The tool supports the direction of writing from right to left for text				✓	Prototype one (Task C)
UAU2	The tool supports the direction of writing from right to left for numbers				✓	Prototype one (Task C)
UAU3	The tool allows users to write with diacritical marks				✓	Prototype one (Task C)
UAU4	The tool supports a right to left user interface		✓	✓		Prototype two (Task F)
UAU5	The tool provides the ability to change the language setting to gender-specific language		✓			Prototype two (Task F)
UAU6	The tool uses understandable literal icons and directional images that reflect the purpose in Saudi culture			✓		Prototype two (Task O)
UAU7	The tool has visual library that reflects Saudi culture such as Saudi clothes, traditional food, and holy sites in Islam			✓		Prototype two (Task O)
UCH1	The user interface takes into account gender-based differences to customise their preferences		✓			Prototype two (Task F, N)
UCH2	The tool use video-based help	✓				Prototype One (Task B)
UCH3	The user interface uses funny, colourful, encouraging and entertaining content	✓	✓	✓		Prototype One & Two
UCH4	The design of the user interface is easy and simple to use	✓	✓	✓		Prototype One & Two

UCH5	The fonts (style, colour) in the tool are easy to customise	✓				Prototype One (Task N)
UCH6	The user interface uses animation and sound effects			✓		Prototype Two
UCH7	The user interface has a clear and consistent navigation	✓	✓	✓		Prototype One & Two
UCH8	The user interface uses clear understandable icons	✓				Prototype One & Two
UCH9	The tool allows users to customise the look of the personal avatar	✓				Prototype One (Task N)

J.2 Participant Information Sheet

Study Title: Assessing and Identifying Children's Motivational Requirements in web-based st
writing Tools
Researcher:Mashael Asiri **Ethics number**: 41075

Please read this information carefully before deciding to take part in this research. If you happy to participate you will be asked to sign a consent form.

What is the research about?
This research is assessing and identifying an appropriate web-based story writing tool motivating children. The aim of this study is developing the instrument, for the content o framework that will be used to inform the motivational requirements to support teache identifying web-based tools that can motivate Arab children to write Arabic stories. This res is under direction of the School of Electronic and Computer Science, University of Southam UK.

Why have I been chosen?
I invited you to participate in this study focus in child' behaviour toward motivation to write A digital stories. Your opinion will help in developing the instrument for Assess and identify an appropriate web-based tool that motivates Arab children to write stories.

What will happen to me if I take part?
When you are agreed to participate,

- First, The researcher will give you an overview of the detailed tasks that required in the experi
- Second, you will be given the relevant material relating to the experiment (list of activities online survey)
- Third, you will be given the laptop, which has the prototype to use them for examinatio performing each of the relevant activities on the list. You can examine the prototypes as much as needed to complete the tasks.
- Fourth when you finishing assessing the tools and doing all tasks, the researcher will give yo online survey by using iPad and ask you to complete it. You would spend at most 45 minut answer the questions. At the end of the survey, you will ask a set of three questions relating t clarity of the items and the use of instrument.

Are there any benefits in my taking part?
This research is not designed to help you personally, but your feedback will help me gather educationalist opinions on the development efforts.

Are there any risks involved?
No.

Will my participation be confidential?
Yes. Your information will be stored and used on secure systems and will be used for this stud purpose only and your responses are voluntary and will be confidential. Individual responses w not be identified. All responses will be compiled together and analysed as a group.

What happens if I change my mind?
You have the right to terminate your participation in the research, at any stage, you do not nee give any reasons, and without your legal rights being affected. Your data will be deleted direct you decide to withdraw at any time.

What happens if something goes wrong?

In the unlikely case of concern or complaint, please contact Research Governance Manager (02380 595058, rgoinfo@soton.ac.uk).

Where can I get more information?

For further details, please contact either myself or my study supervisor, Dr Gary Wills and Proof Mike Wald

Mashael Asiri: mma2g14@ecs.soton.ac.uk
Gary Wills: gbw@ecs.soton.ac.uk
Mike Wald: mw@ecs.soton.ac.uk

J.3 The lists of experimental activities

The lists of activities which used in both experiments to help guide the participant when examining the tools.

In Experiment one

Please execute the following tasks

Task A: create a user account and follow the instructions

1. Go to https://storybird.com
2. Click Sign up
3. Click on 'regular user'
4. Choose the child age' 9-12'
5. Type your username or email address
6. Type your password
7. Click on 'create account'
8. Go to your email and activate the account
9. Sign in your username and password
10. Follow the instruction by click next

Or

If you don't have email

1. Type the Username: 'nouraalshammary' Or the Email: 'nouraalshammary2055@gmail.com'
2. Type the Password: 'mash6400'
3. Click on 'sign in'
4. When you open your page please follow the instructions by clicking on ' Next' button to introduce how the websites work.

Watch this tutorial https://www.youtube.com/watch?v=p_xBhEux9KY

Task B: writing a story and publishing it

1. In the top page click on' CREATE'
2. On "Artwork" tab
3. Type in ' traditional' on search all artwork
4. Choose the first picture and click on it
5. Right Click on ' Use this Art'
6. From the drop down menu choose 'picture book (multi-chapter)'
7. At the bottom of the page click on the first page' cover'
8. In the text box write down the book title you want
9. Open this website https://tahadz.com/mishkal
10. Copy or write down this story on the first text box

شكا رجل إلى طبيب وجعا في بطنه، فقال الطبيب:ماالذي أكلت؟ قال: اكلت رغيفا محترقا،فدعا الطبيب بكحل ليكحل المريض، فقال المريض:إنما أاشتكي وجعا في بطني لا في عيني، قال الطبيب: قد عرفت، ولكن أكحلك لتبصر المحترق، فلا تأكله!

11. Click on ‘تشكيل ‘
12. Change the didactical marks for the word بُطْنِهِ to بَطْنِهِ by clicking on the word
13. Copy the story after didactical marks
14. Return back to the story bird
15. Add page from ‘ + ‘ sign in the right corner of the page
16. Drag and drop any pictures
17. Paste the story on the same page of the picture
18. Save and exit
19. **Choose I'm finished. Publish my story:** Privately
20. Click publish

Task C inviting collaborator

1. Repeat the same steps in task B until step no 15
2. Click on options
3. Invite collaborator
4. Type in email the collaborator
5. if you cant see this button please watch this video
6. https://www.youtube.com/watch?v=XHkL9IZ5_vM
7. In minute 2.40

Task D Participating in challenging task

1. Click on ‘create’
2. Click on ‘challenges’ tab
3. Click on ‘get details’
4. Scroll down and then click on ‘Do the challenge’

Task E Accessing student reinforcement

1. Click on ‘You’ tab on the top of the page
2. Click on ‘your stuff’
3. Click on ‘dashboard’
4. Click on ‘daily writing’
5. Click on’ special badges’

In teacher page

Task H: Signing in into teacher account

5. Enter the Username: ‘mesh205’
6. Enter the Email: ‘sh3ool205@hotmail.com’
7. Enter the Password: ‘mashael205’

Task I: Adding a new class

1. Click ‘Studio’
2. Click on

on the left corner of the page
3. Click on ‘Add a class ‘
4. Type in the class name
5. Choose the ‘class grade level’
6. Click on ‘Next’
7. Choose the end date for this class
8. Click on ‘create class’

Task J: Adding a new students

1. click on

2. Choose your class and then click on it
3. Click on ‘student’ tab 

4. Click on ‘add’ tab
5. Type in two usernames for your students **Such as meme205 or lolo205**
6. When you finished Click on ‘Add account’ for each student

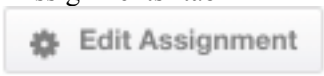
Task K Creating and editing an assignment

1. Click on ‘Assignment’ tab
2. Click on ‘Create an Assignment’ button
3. Type in the name of the assignment
4. Type in the description of the assignment
5. In Artwork section, choose ‘Use art work’
6. In format section, choose ‘poem (single image)
7. Tick the box ‘include this word list’
8. Copy this list and paste it into the text box

شكا رجل إلى طبيب وجعا في بطنه، فقال الطبيب:ماالذي أكلت؟ قال: اكلت رغيفا محترقا،فدعا الطبيب بكحل ليكحل المريض، فقال المريض:إنما أشتكي وجعا في بطني لا في عيني، قال الطبيب: قد عرفت، ولكن أكحلك لتبصر المحترق، فلا تأكله!

9. Choose the date of submission
10. Click on 

11. Then click on 

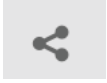
to look how the assignment look like
12. Choose any art work
13. Click on ‘use this art’
14. Click ‘poem’ from dropdown list
15. If you want to change the name of t the assignment
16. Go back to the ‘Assignments’ tab
17. Then click on 

18. And change the name
19. Click on save the assignment

Task L: Teacher give feedback, reward and share children work

1. Click 

2. Choose ‘Smart kids’ class
3. Click ‘Assignments’ tab
4. Click review submission for ‘ قصة جحا
5. On ‘review stories ‘ tab, click on the title ‘poetry’
6. On grading section, click on 

and choose A+
7. Under the story, write down the feedback for the children and then click ‘post’
8. Click on 
to reward the children work with stickers
9. Share children work with his parents by clicking on 

Task M Reading any stories and social reward

1. Click on ‘read tab’
2. Choose any stories

3. Under the story Click on 

to reward the storywriter

Task N customizing the profile and updating avatar

1. Click on 'You' tab
2. Click on 'your stuff'
3. On the right side, choose your profile 'mesh205'
4. Click on 'customize profile '
5. Choose one of this background

6. Now repeat the same steps but click on 'Update avatar'
7. Choose any avatar
8. Click on 'save changes'

Please go to the http://www.smartsurvey.co.uk/s/L7TRS/

In Experiment 2

Please execute the following tasks using http://www.alefbata.com/ **website**

Task F Playing a brief games and use interactive material

1. **Open** http://www.alefbata.com/
2. Click on ' هيا '
3. Type the user name 'mesh asiri' and the password 'mesh205'
4. Click on 'العاب'
5. Scroll down and choose exercise no 180 and then exercise no 188

Please execute the following tasks using http://anasworld.net/ website

Task O checking the Arabic user interface

1. Open this website http://anasworld.net/
2. Go over the icons in the website and listen
3. Click on 'قرآني'
4. back to the main page by using 
5. Click on 'السيرة النبوية'
6. Click on play button 
7. Go to the next page of the story 

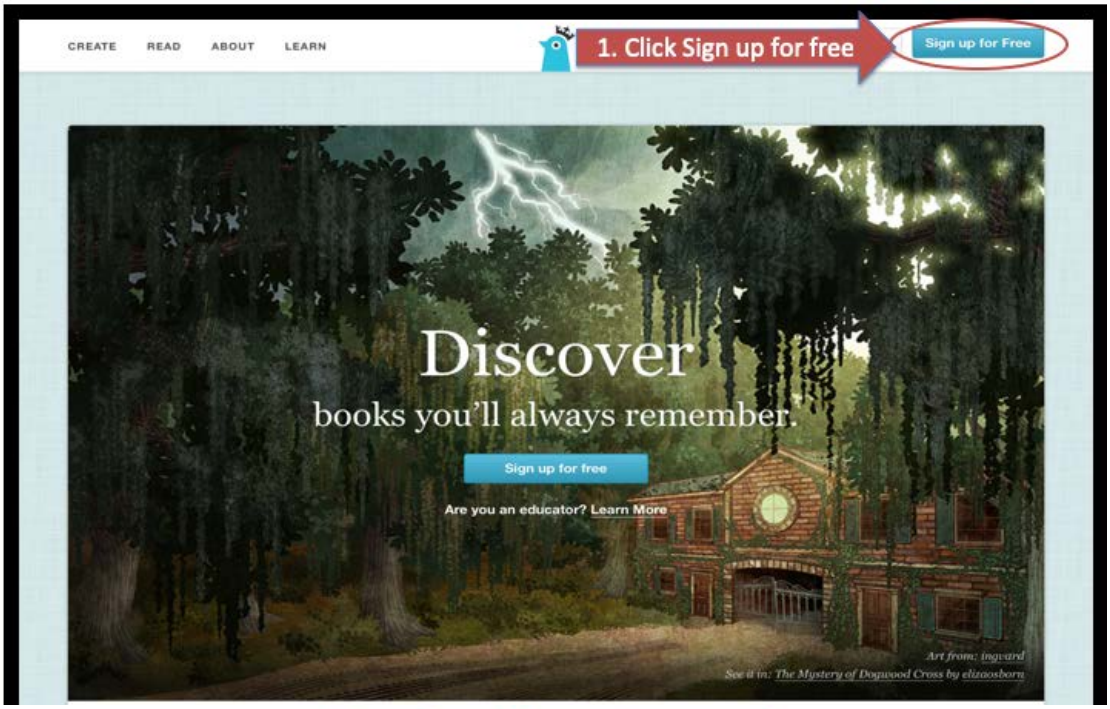
J.4 Experimental Prototypes

Experiment 1

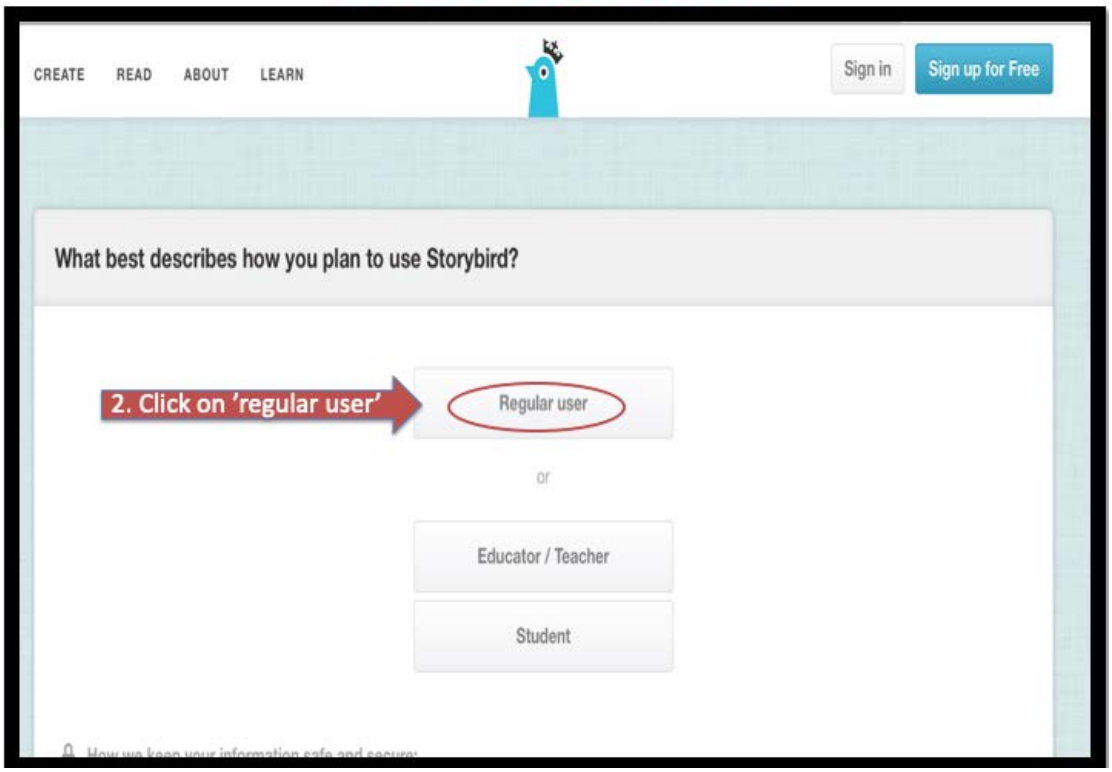
Task A

Create a User Account

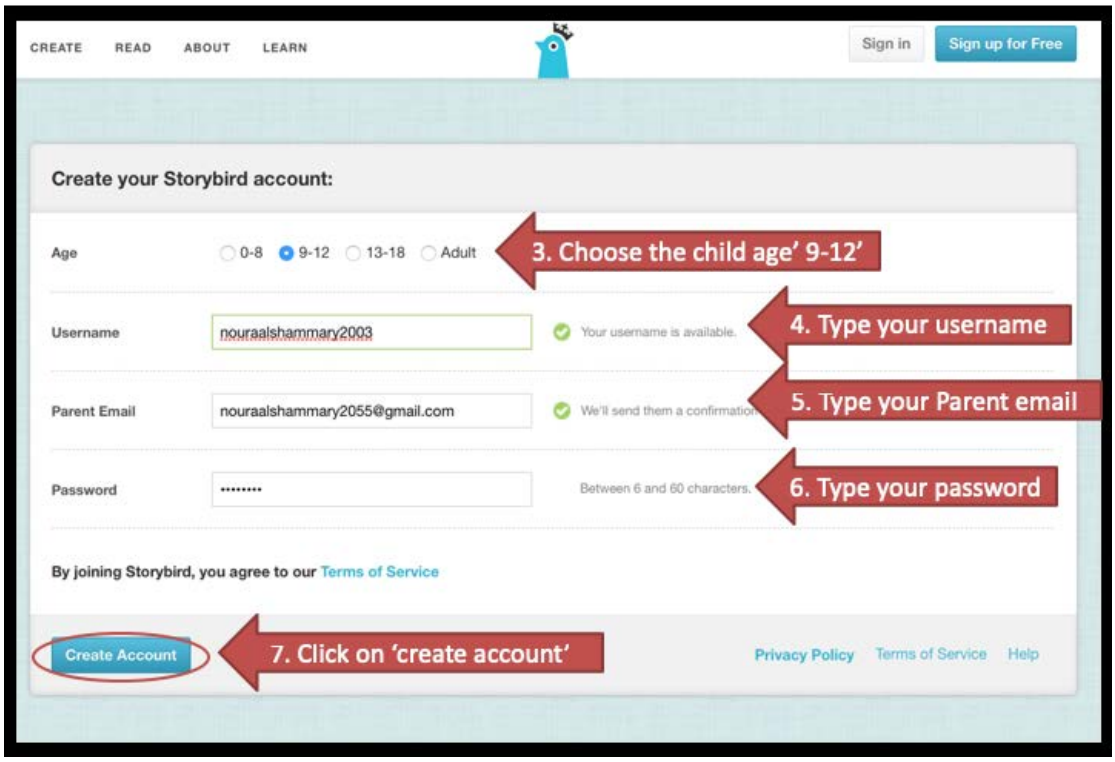
Create a User Account



Create a User Account



Create a User Account

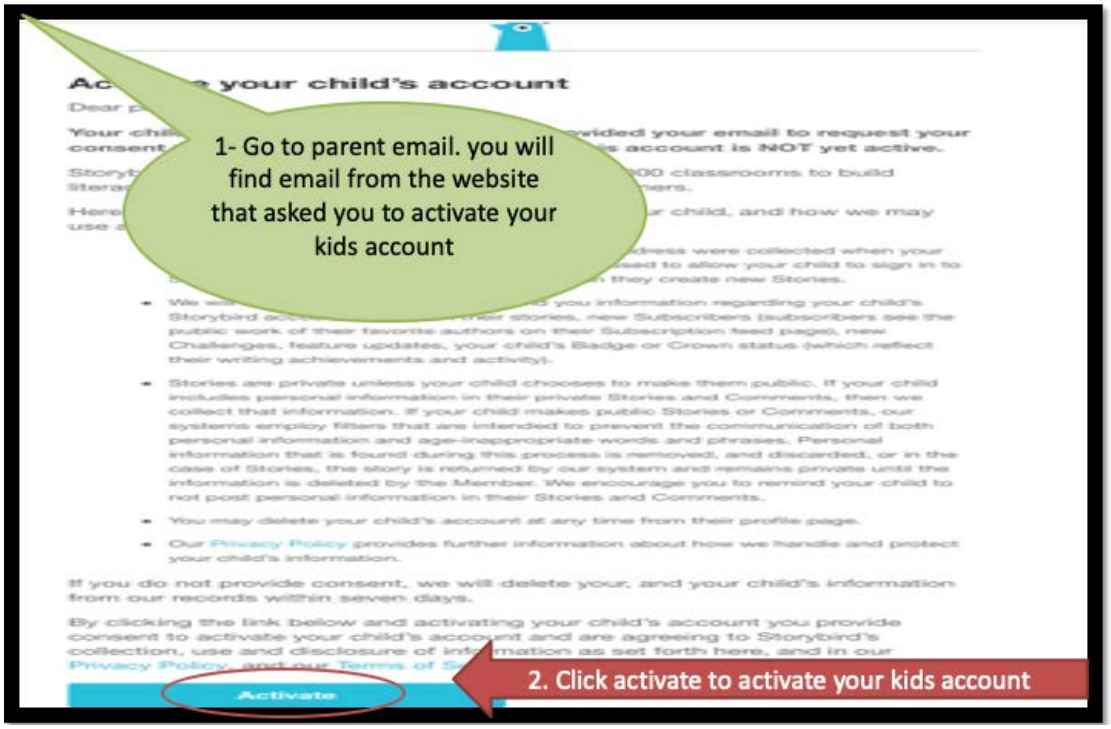


Task B

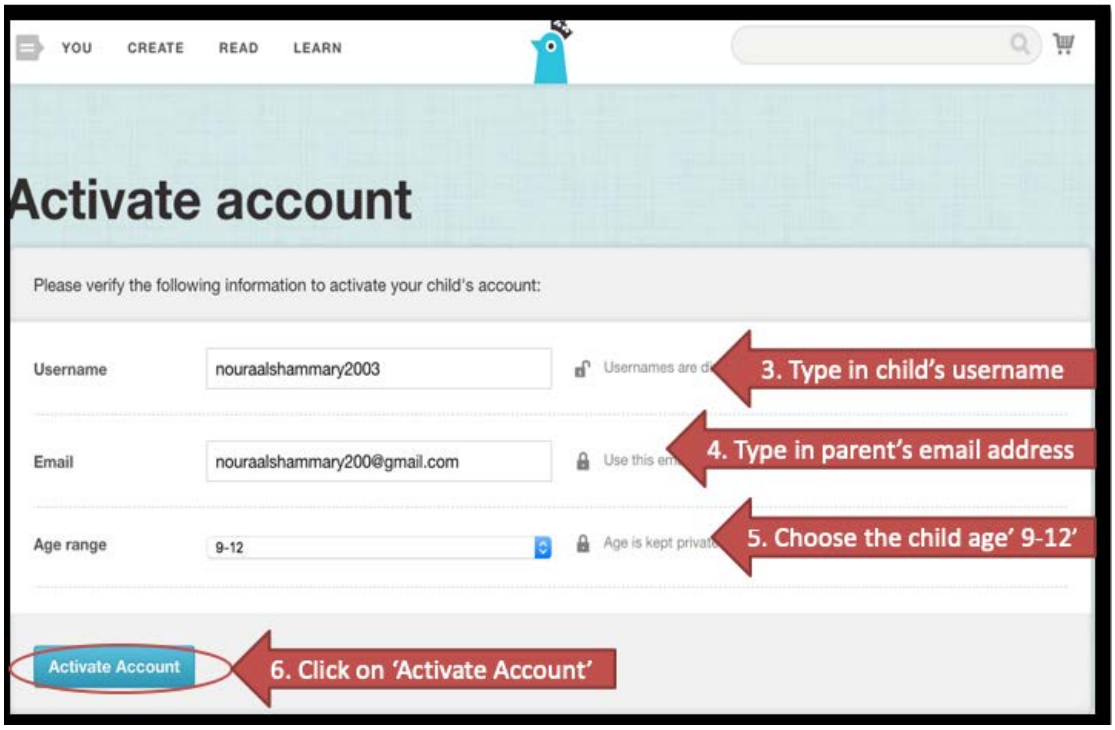
Follow the Instructions by using Video based help

(Help- Access to examples – writing with multi forms)

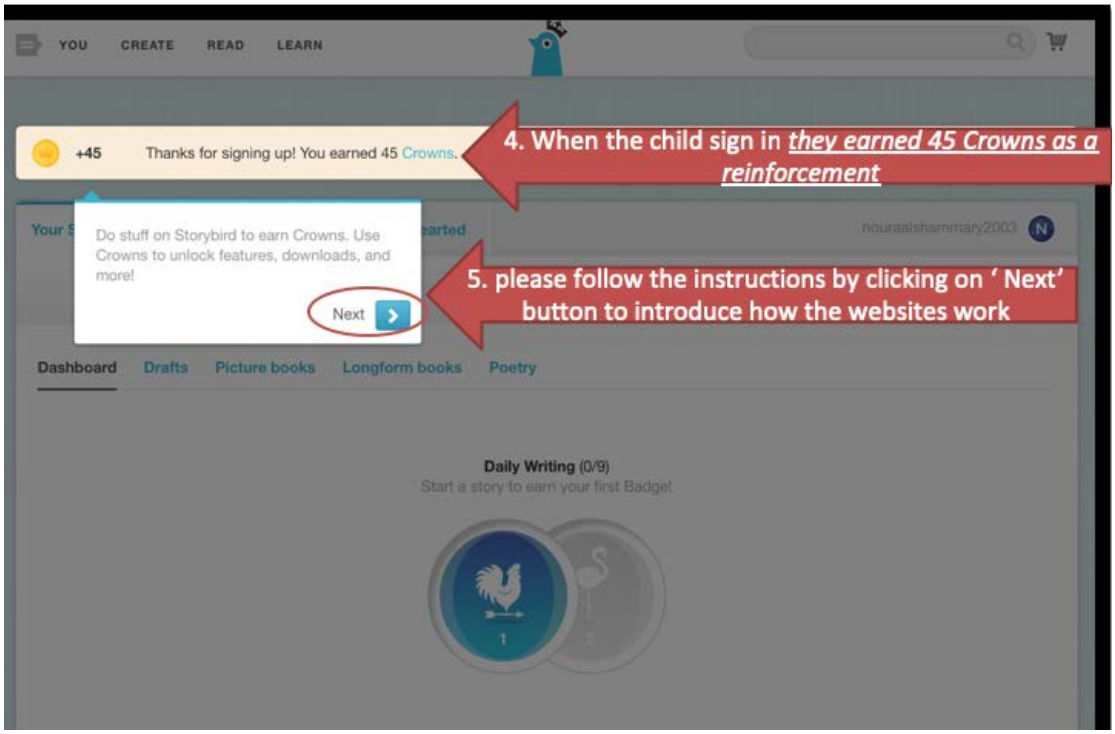
Follow the Instructions



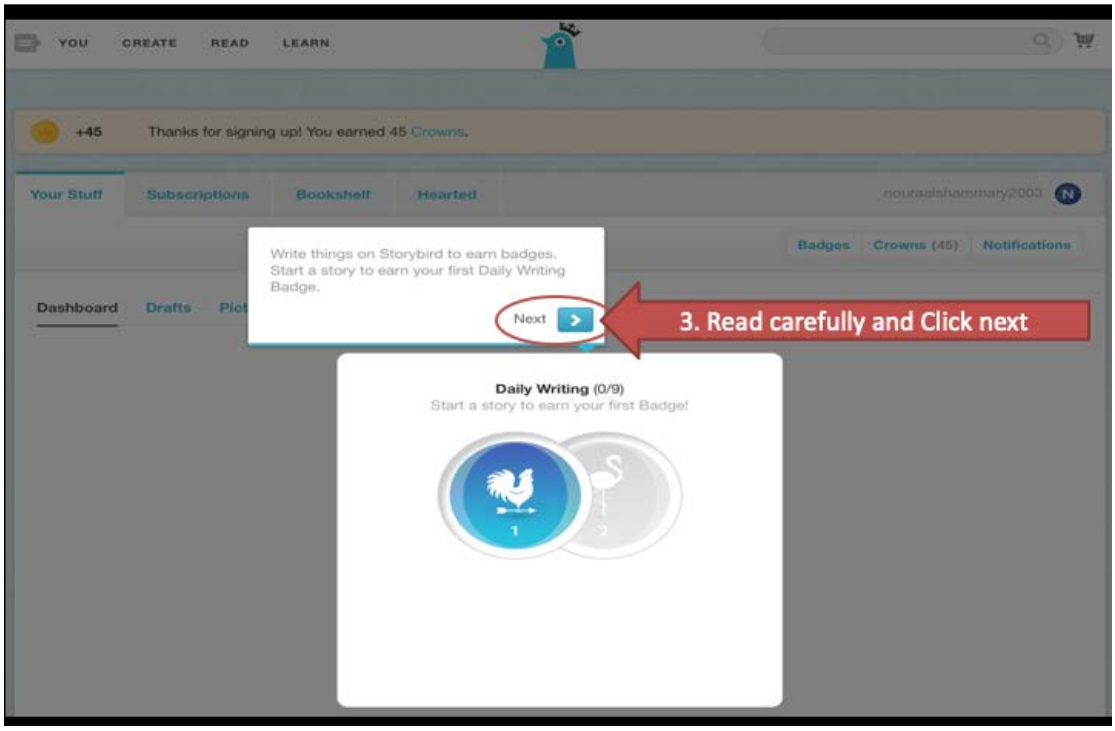
Follow the Instructions



Follow the Instructions



Follow the Instructions



Follow the Instructions and access examples of stories forms

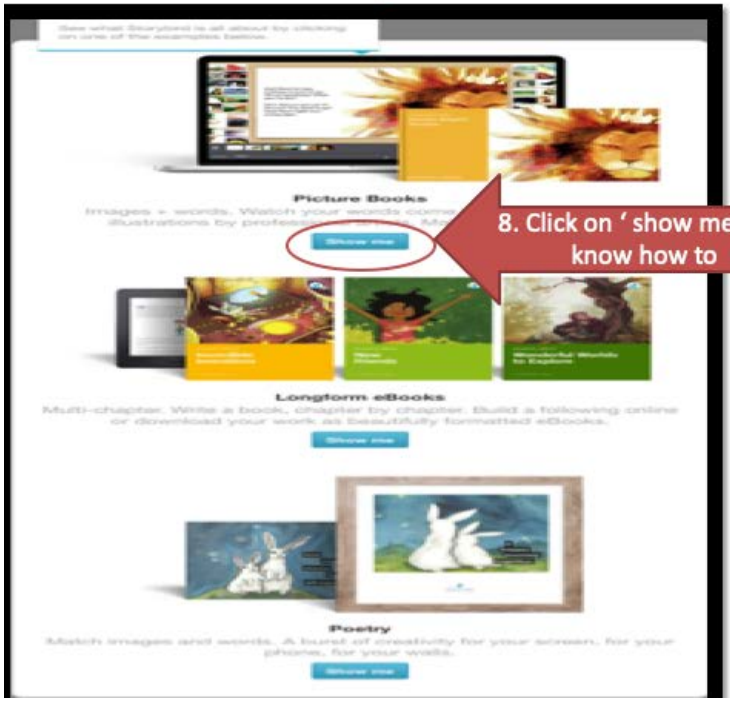
4. Within instructions you will find examples of stories forms before starting your writing

5. Access example of writing picture story (images and words)

6. Access example of writing long form of story (multi-chapter)

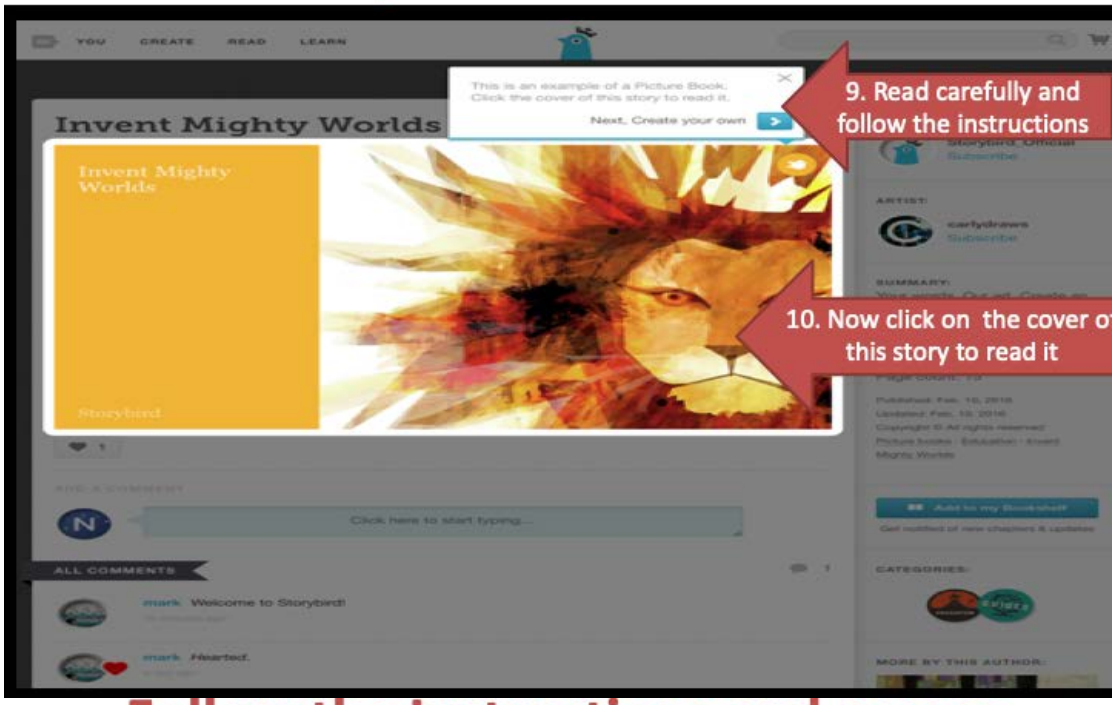
7. Access example of writing short story'poetry' (play with images and few words)

Follow the Instructions and access examples of stories forms

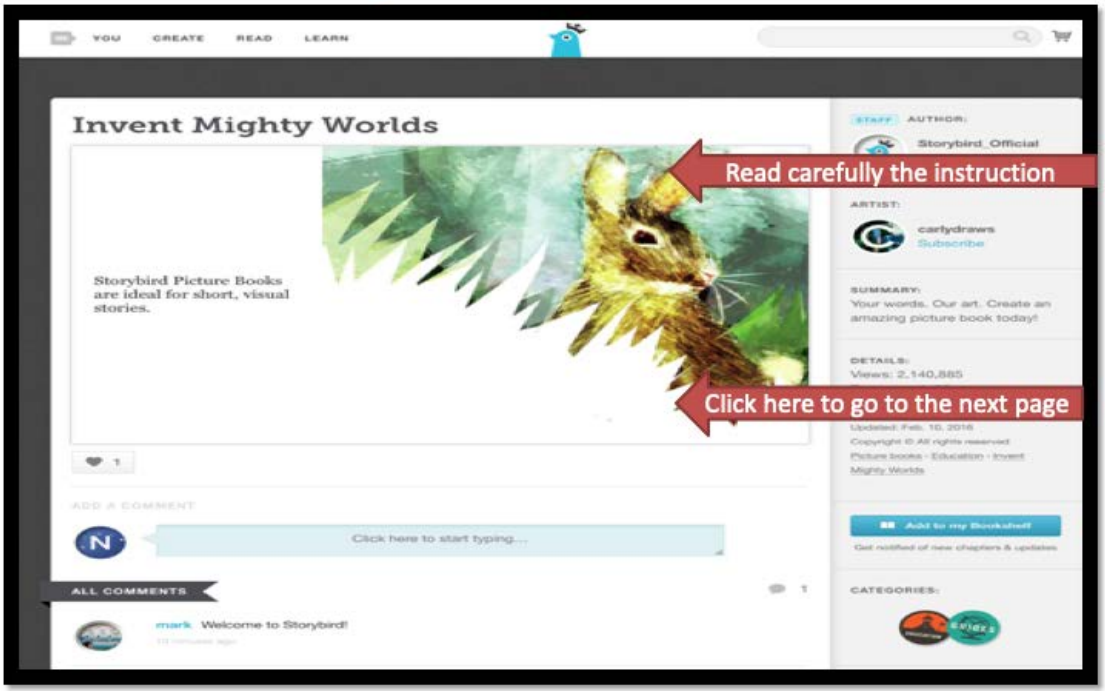


8. Click on ' show me' for the first example to know how to write ***picture story***

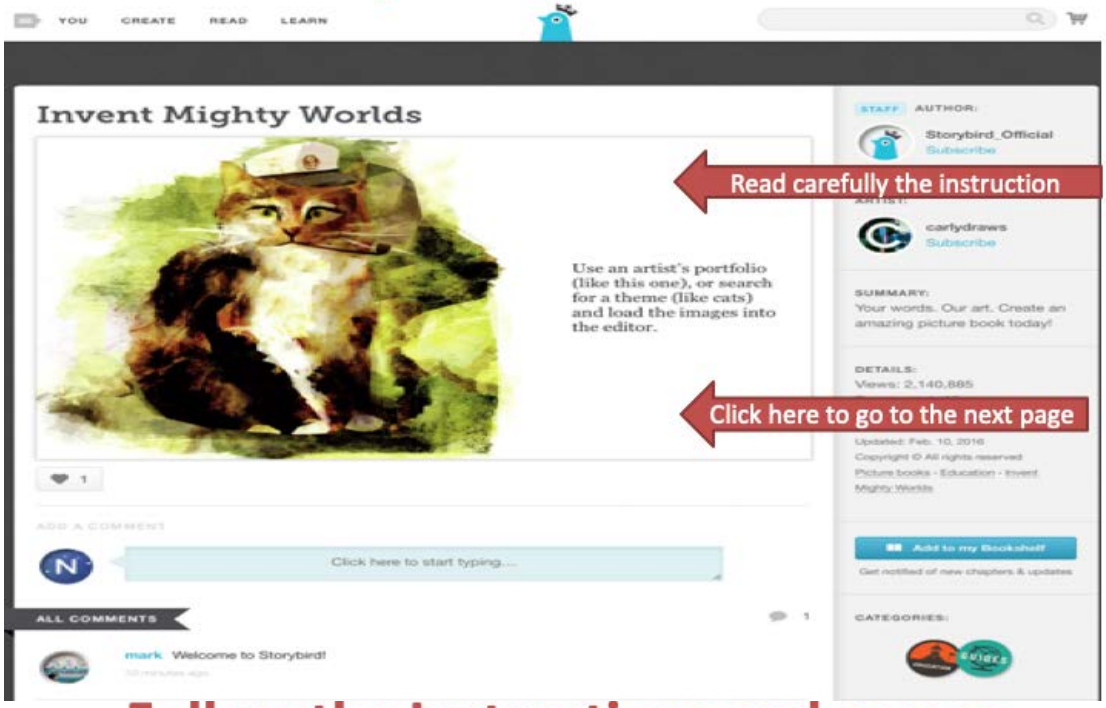
Follow the Instructions and access examples of stories forms



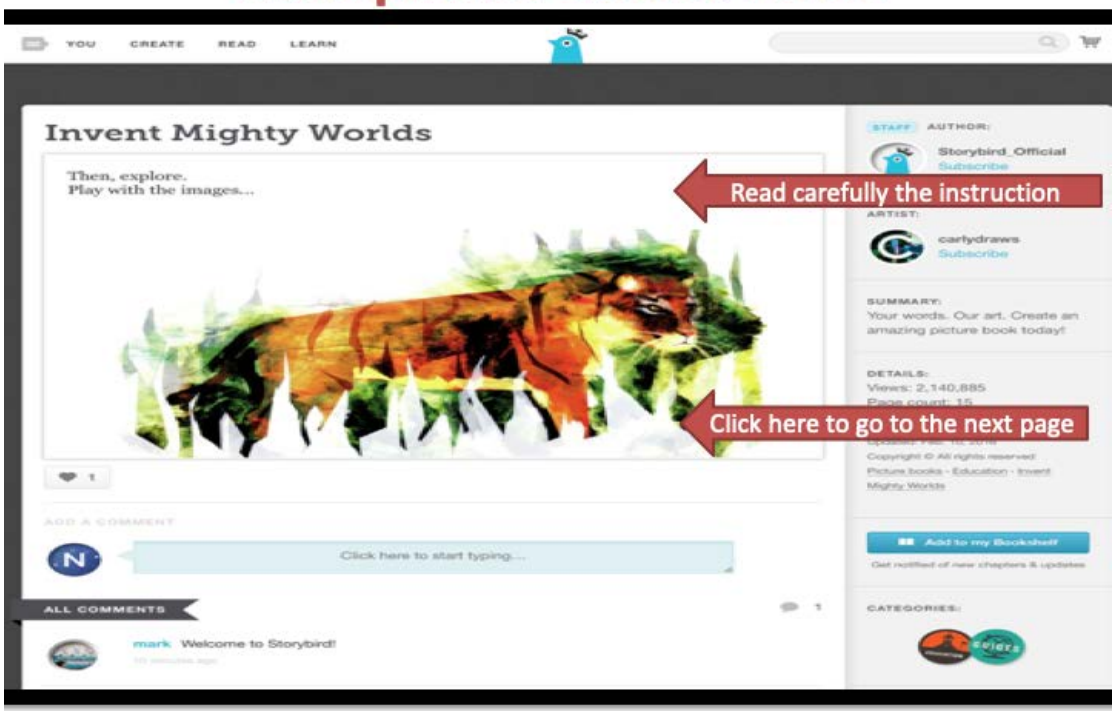
Follow the Instructions and access examples of stories forms



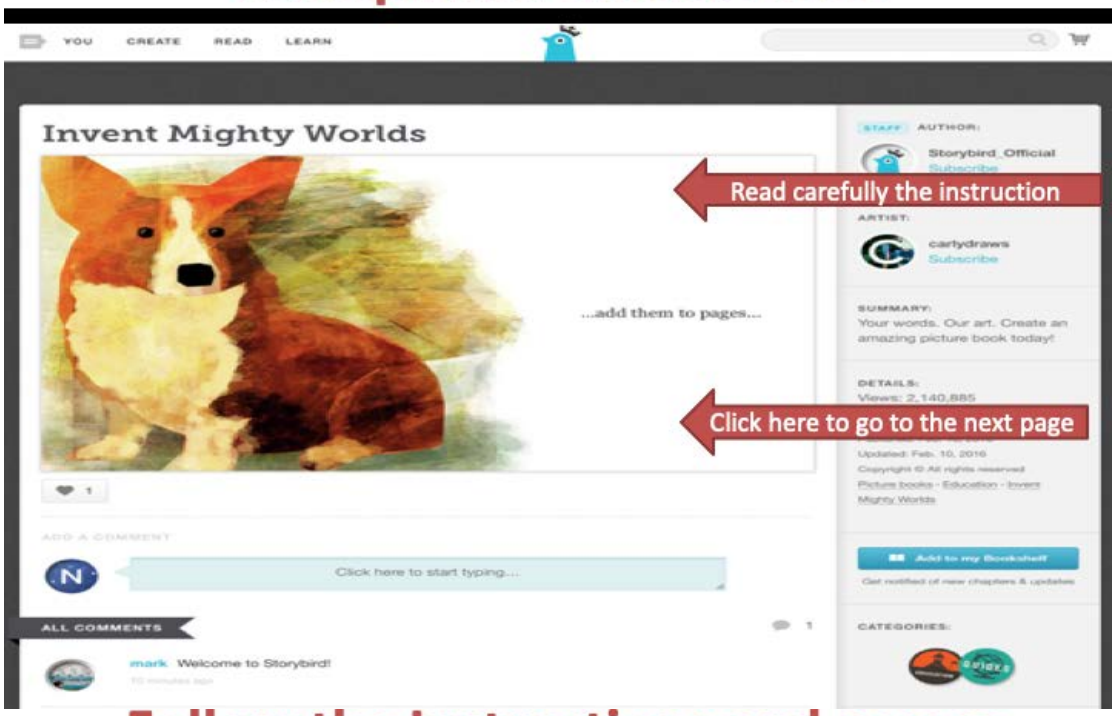
Follow the Instructions and access examples of stories forms



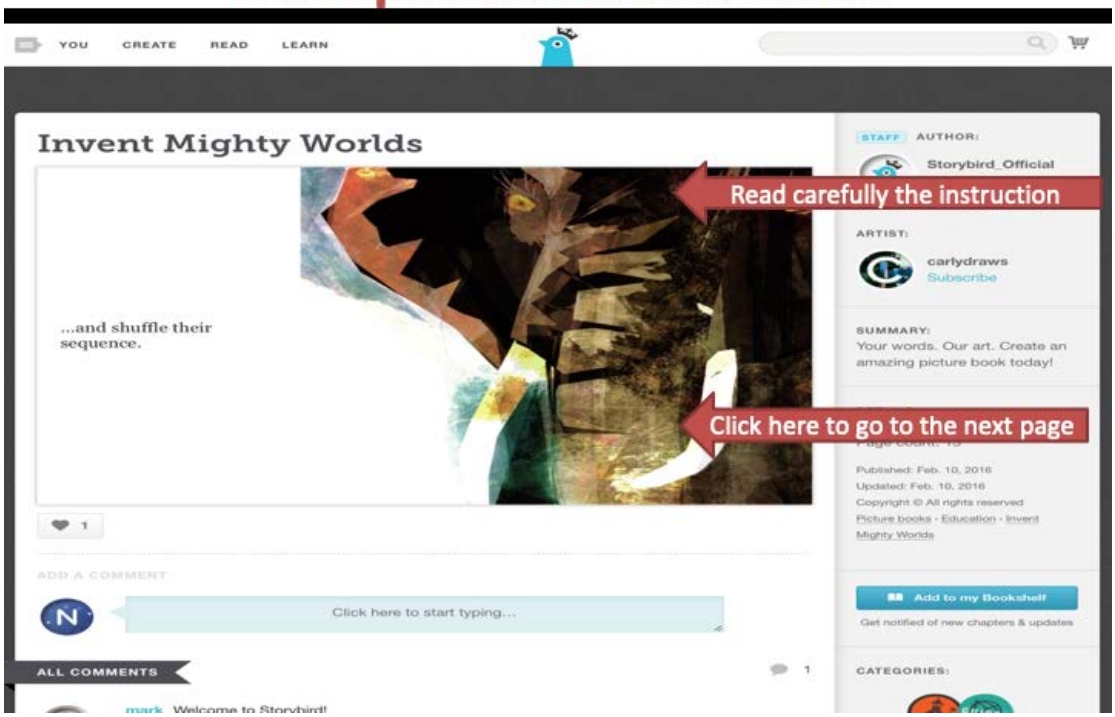
Follow the Instructions and access examples of stories forms



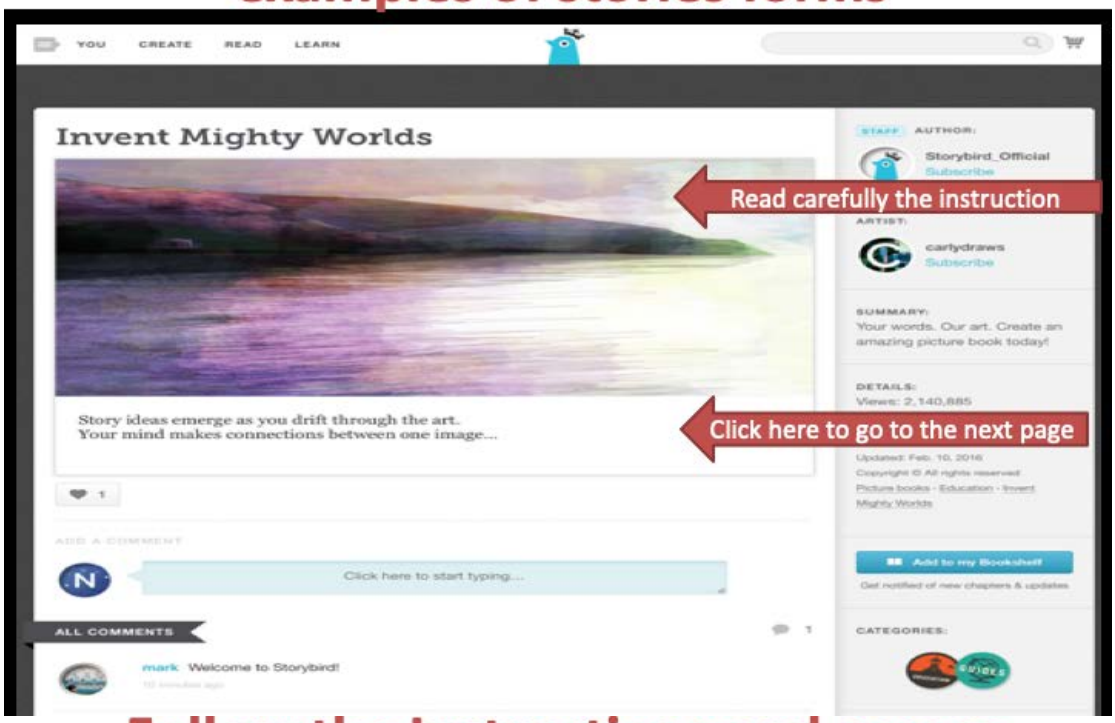
Follow the Instructions and access examples of stories forms



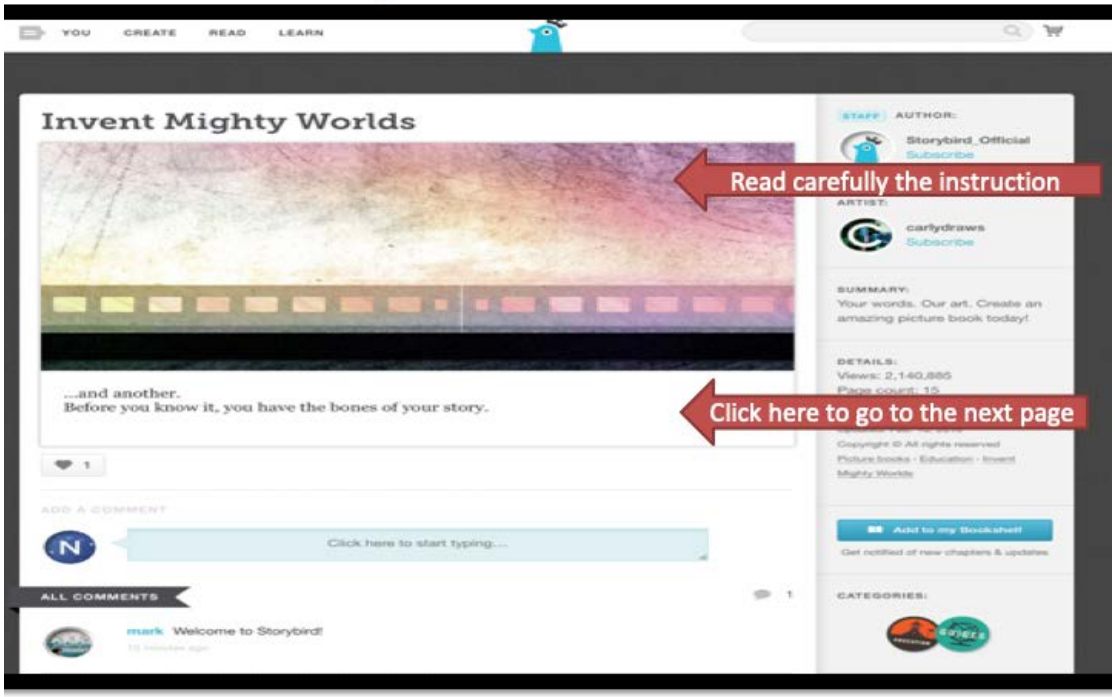
Follow the Instructions and access examples of stories forms



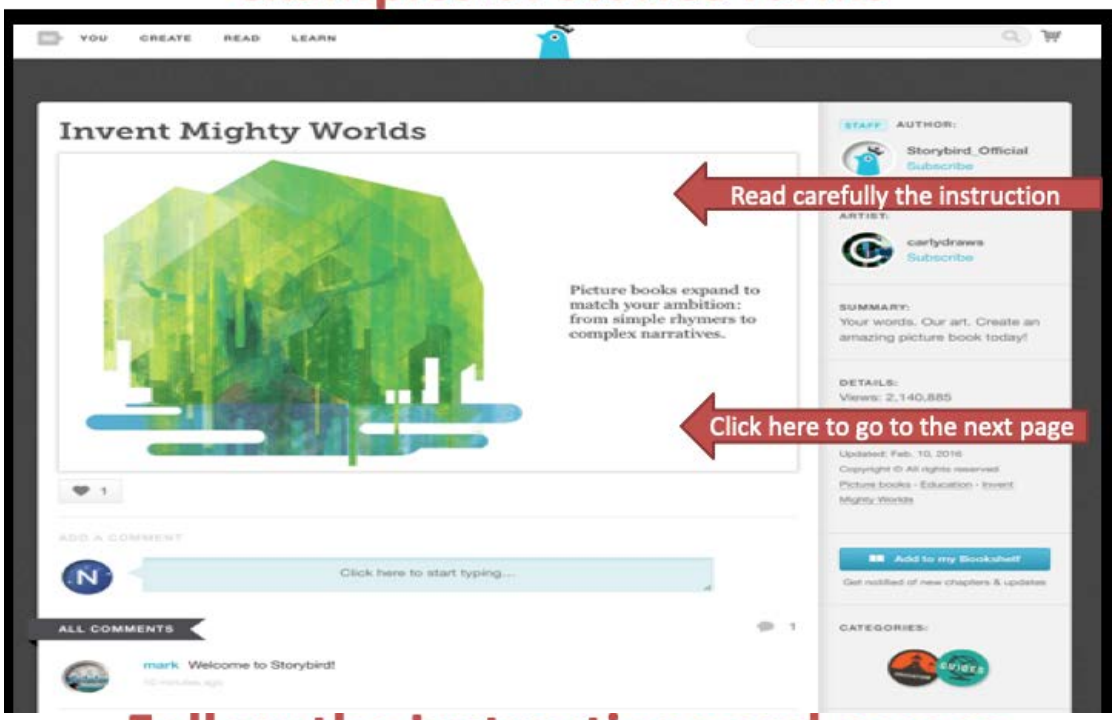
Follow the Instructions and access examples of stories forms



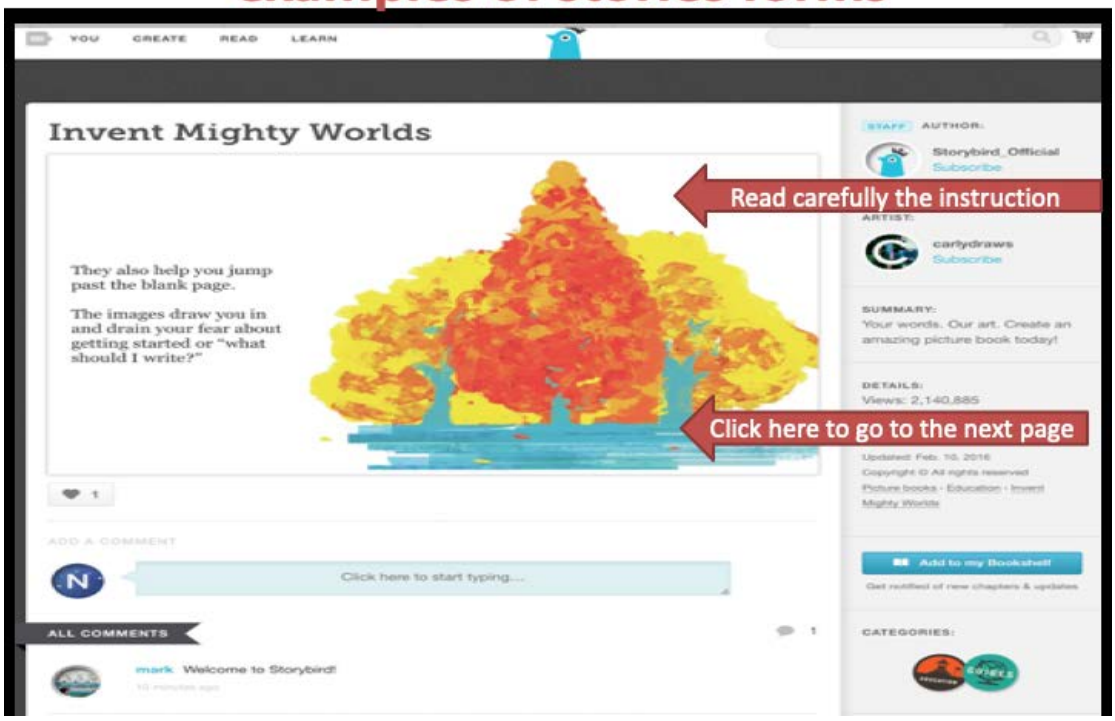
Follow the Instructions and access examples of stories forms



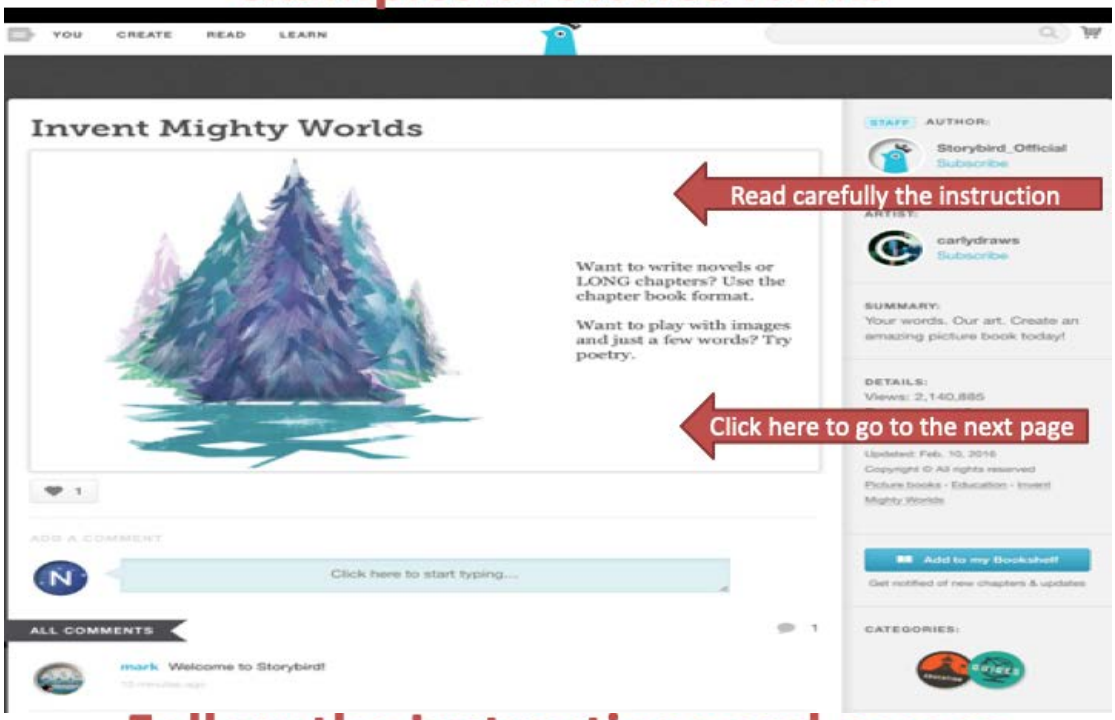
Follow the Instructions and access examples of stories forms



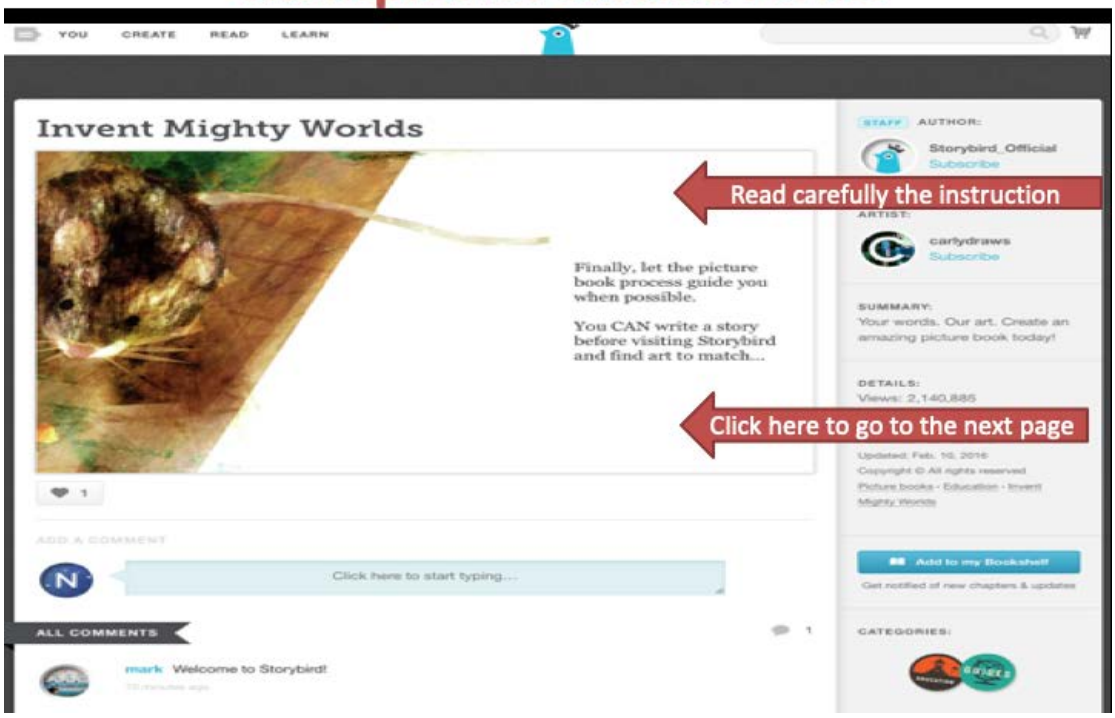
Follow the Instructions and access examples of stories forms



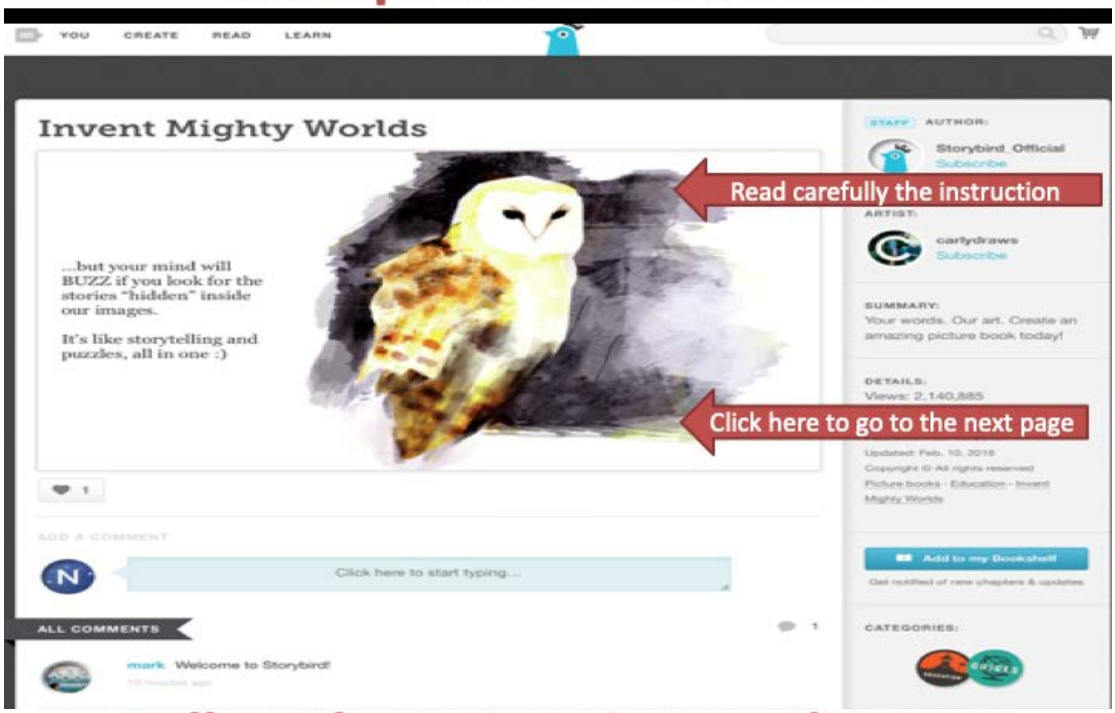
Follow the Instructions and access examples of stories forms



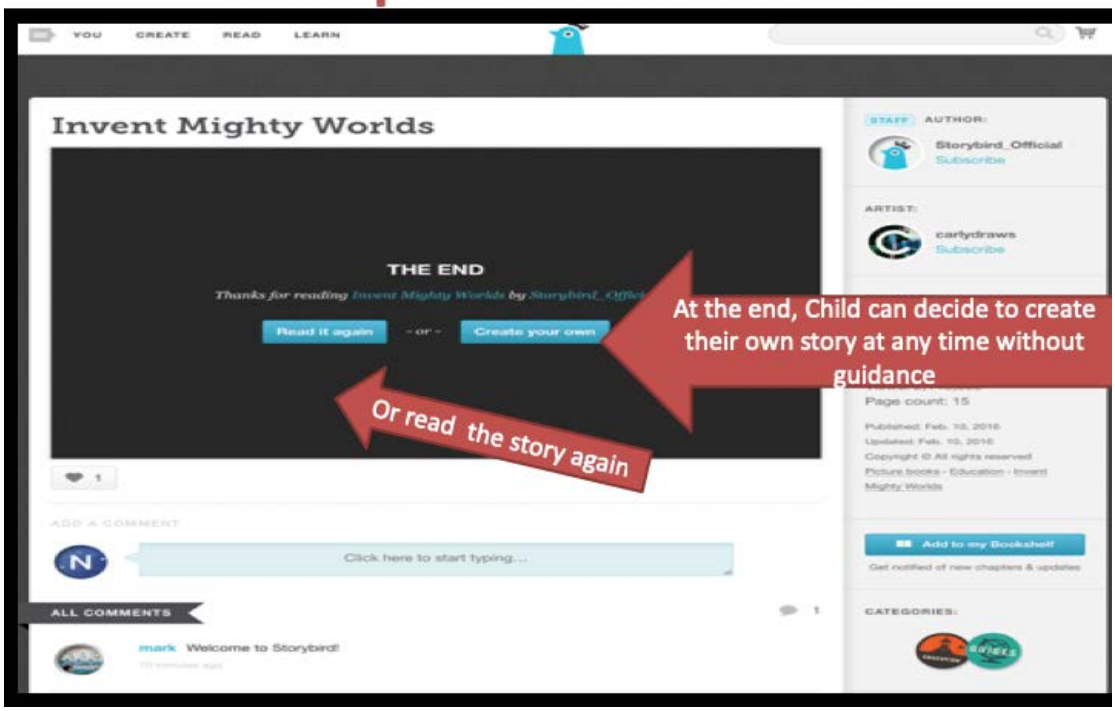
Follow the Instructions and access examples of stories forms



Follow the Instructions and access examples of stories forms



Follow the Instructions and access examples of stories forms

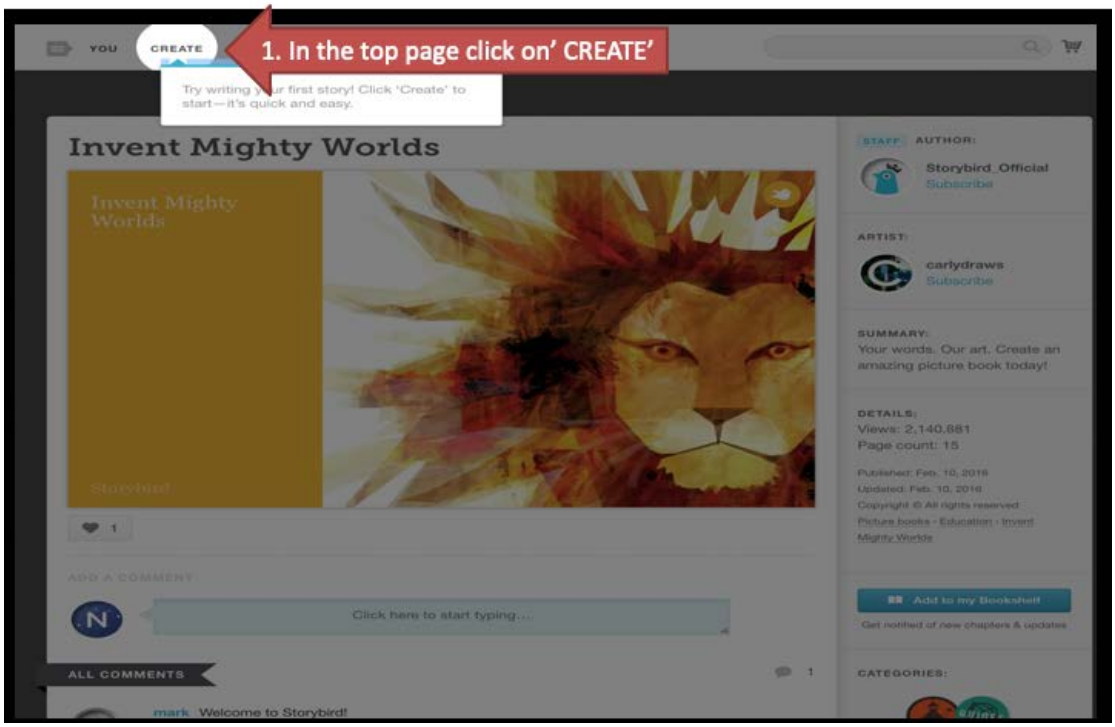


Task C

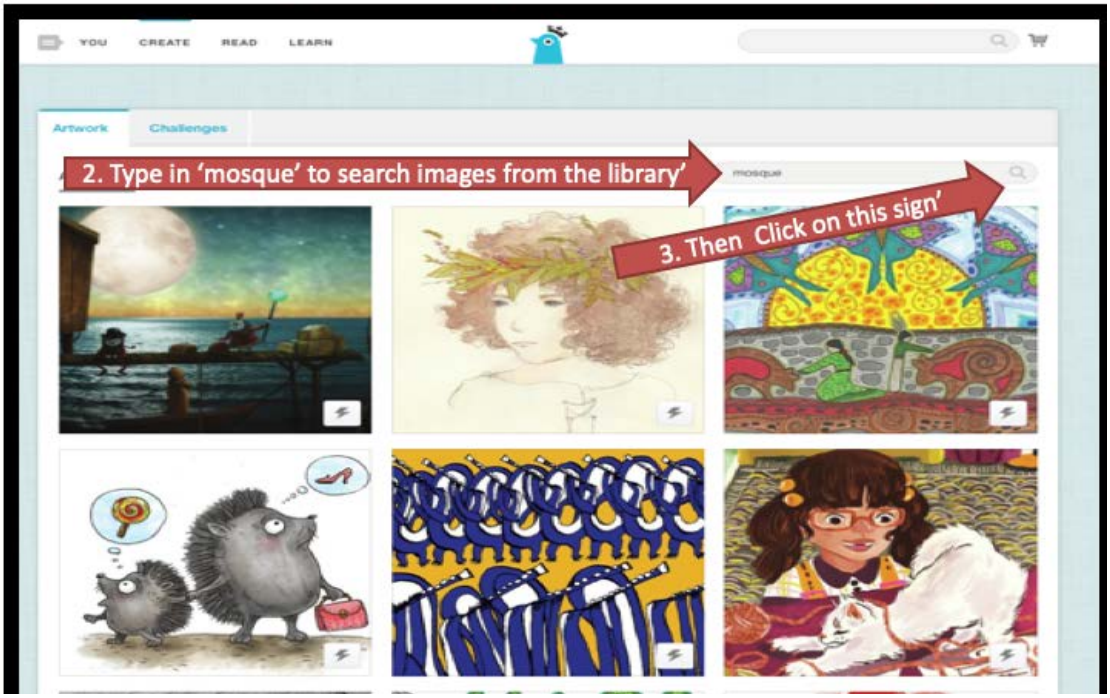
Writing a Story and Publishing it

(writing-organizing-publishing)

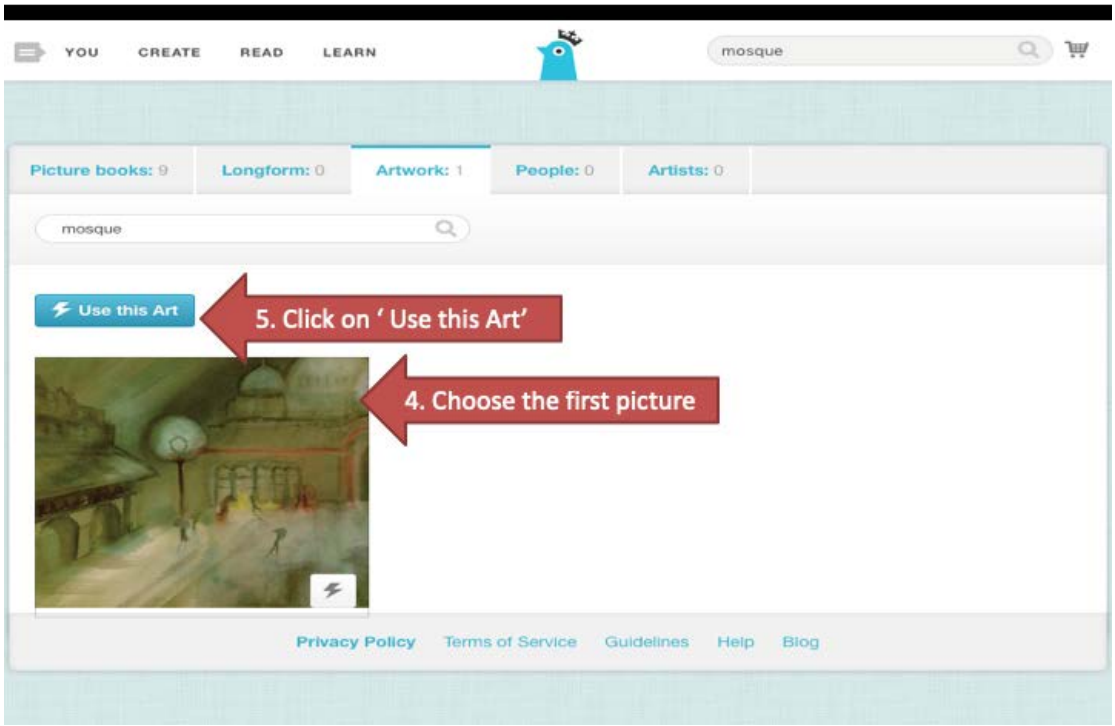
Writing a Story and Publishing it



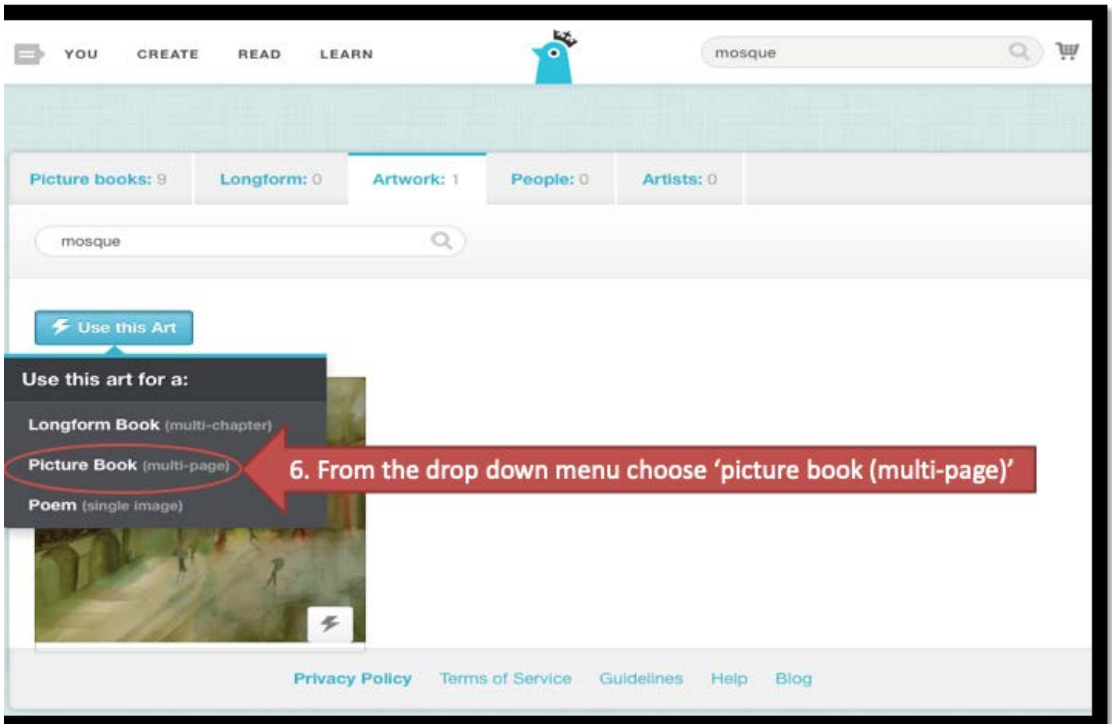
Writing a Story and Publishing it



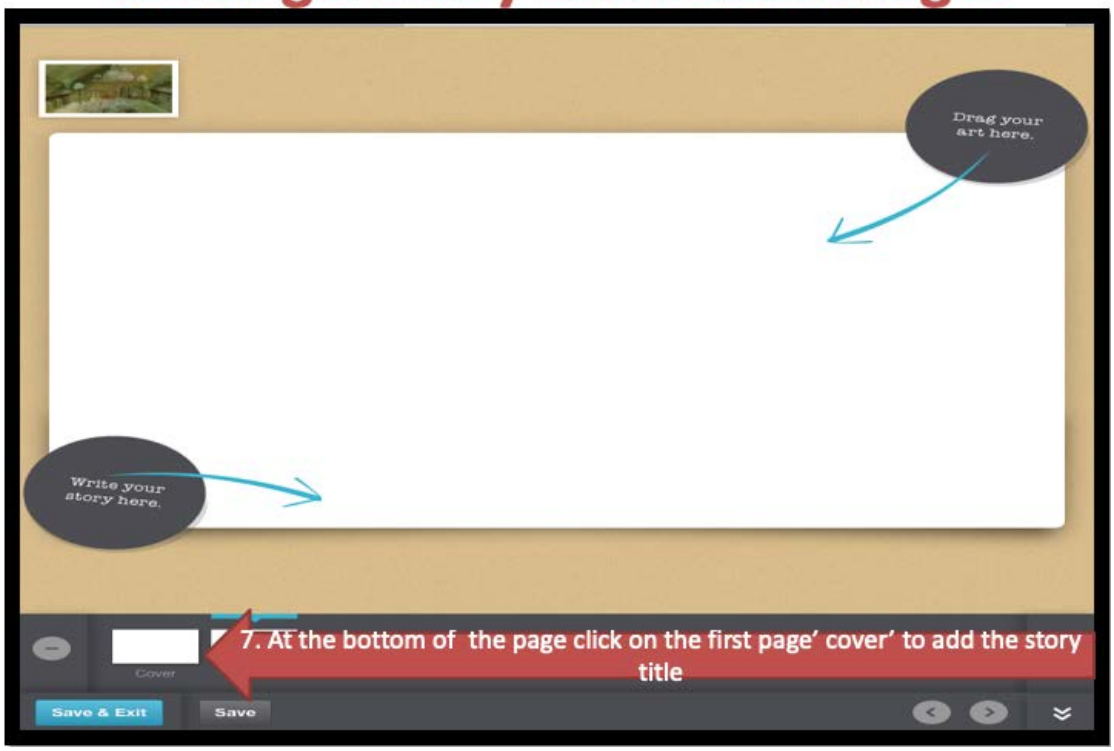
Writing a Story and Publishing it



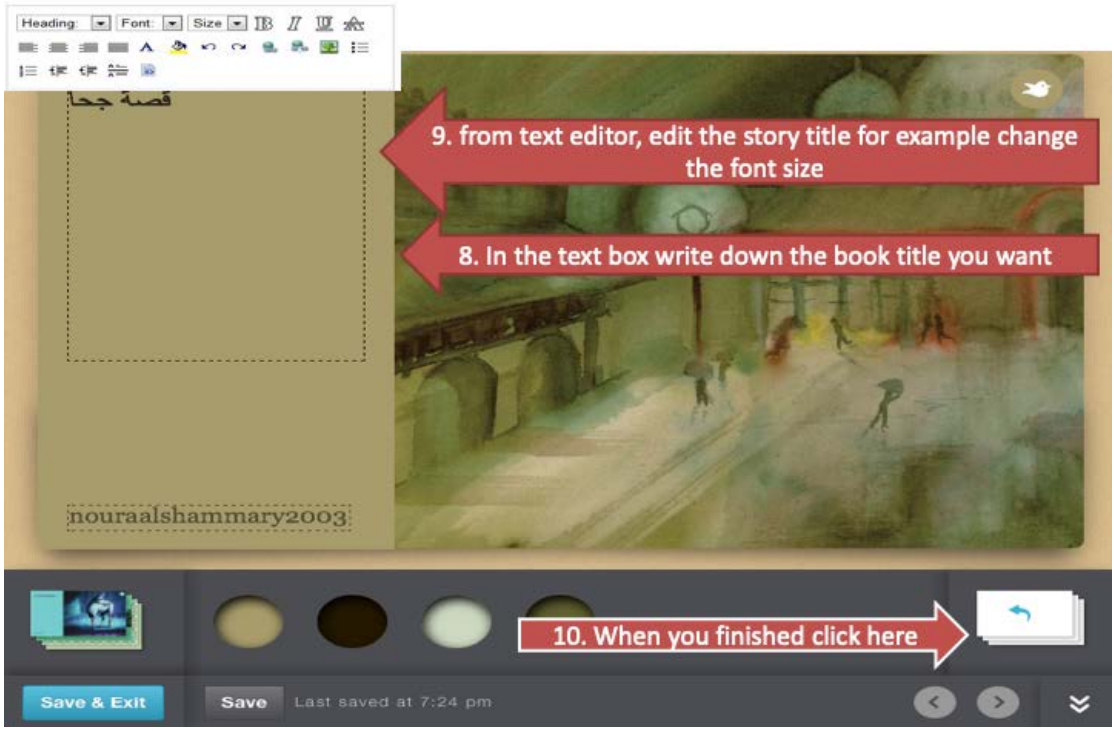
Writing a Story and Publishing it



Writing a Story and Publishing it



Writing a Story and Publishing it



Writing a Story and Publishing it

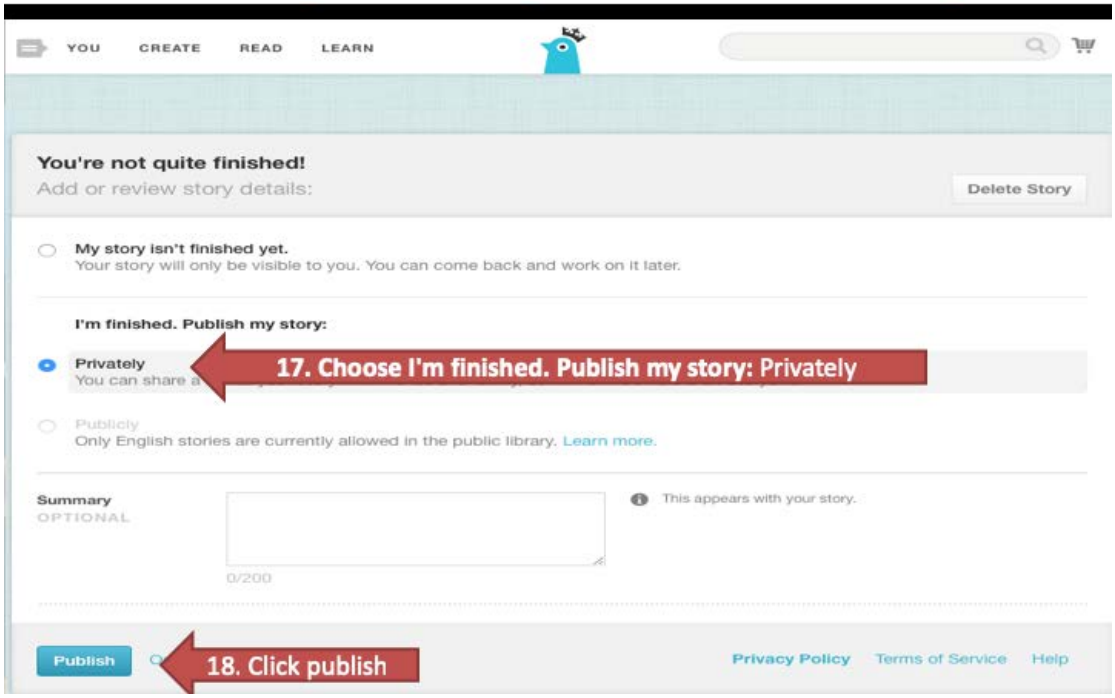
Writing a Story and Publishing it

Writing a Story and Publishing it

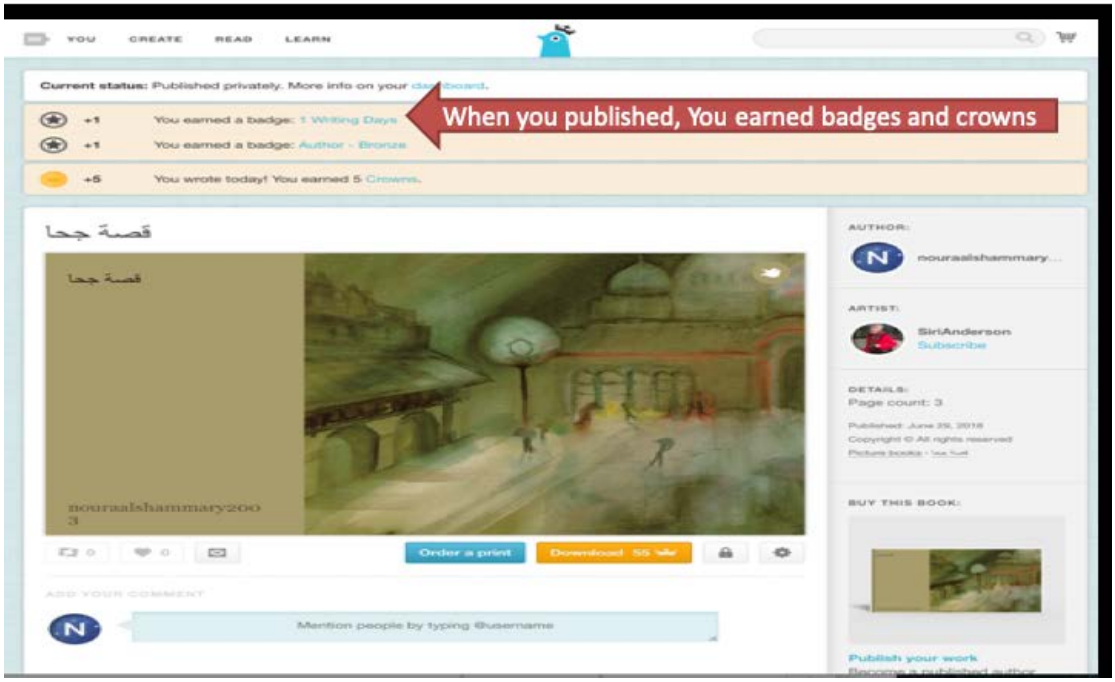
Writing a Story and Publishing it

Writing a Story and Publishing it

Writing a Story and Publishing it



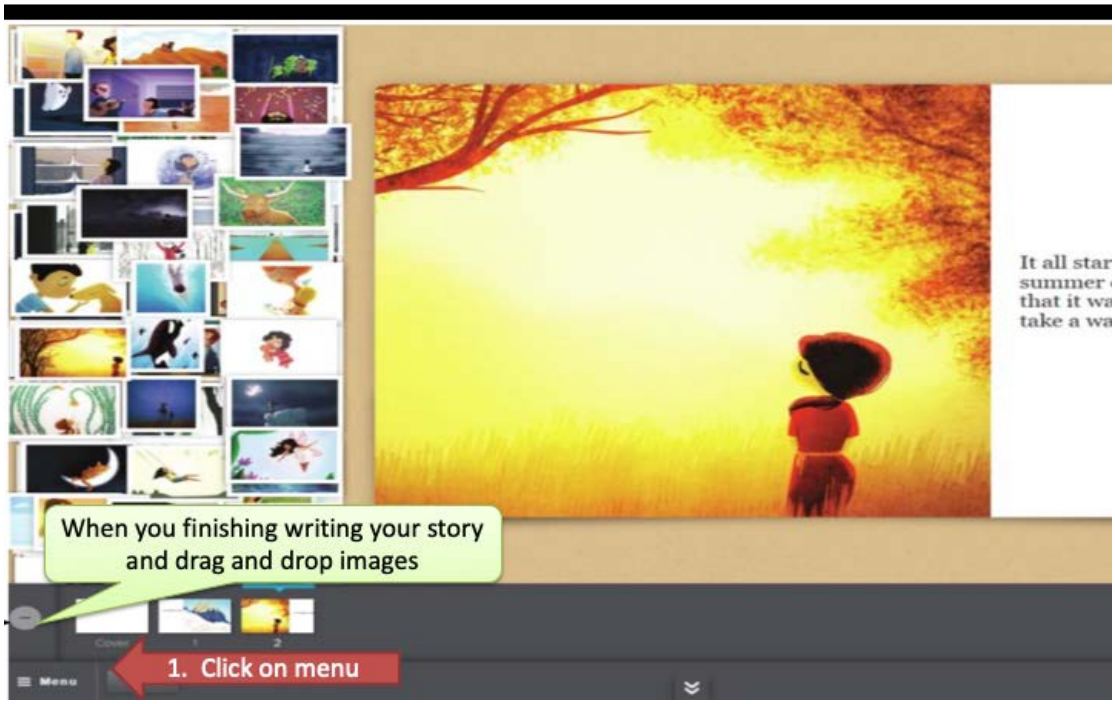
Writing a Story and Publishing it



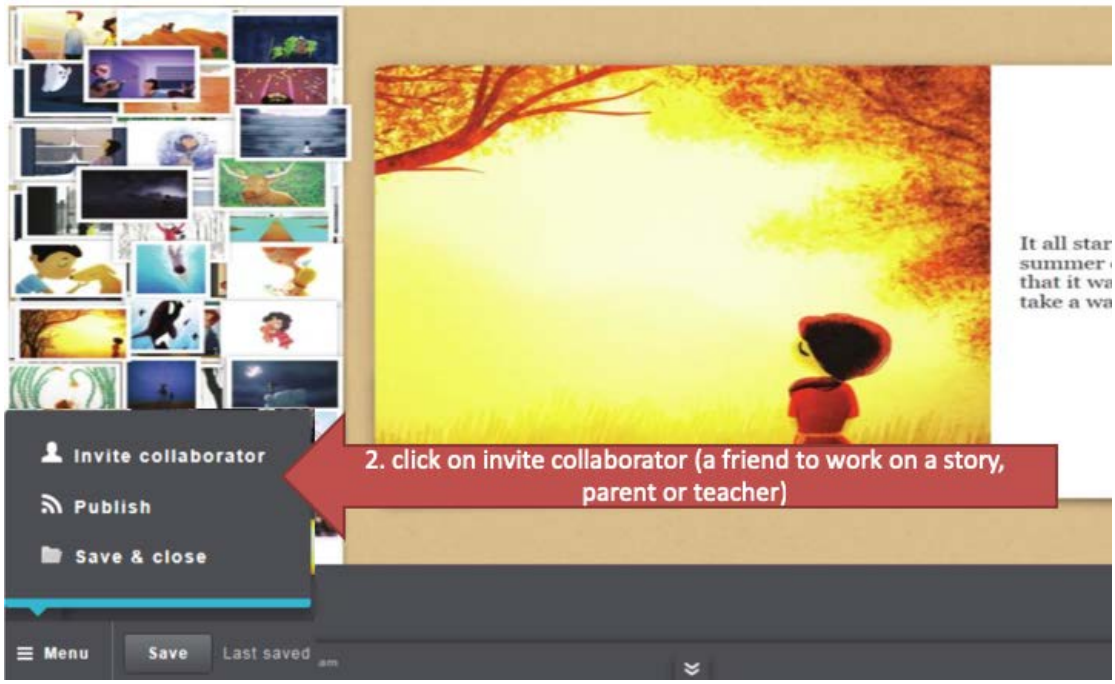
Task D

Invite Collaborator

Invite Collaborator



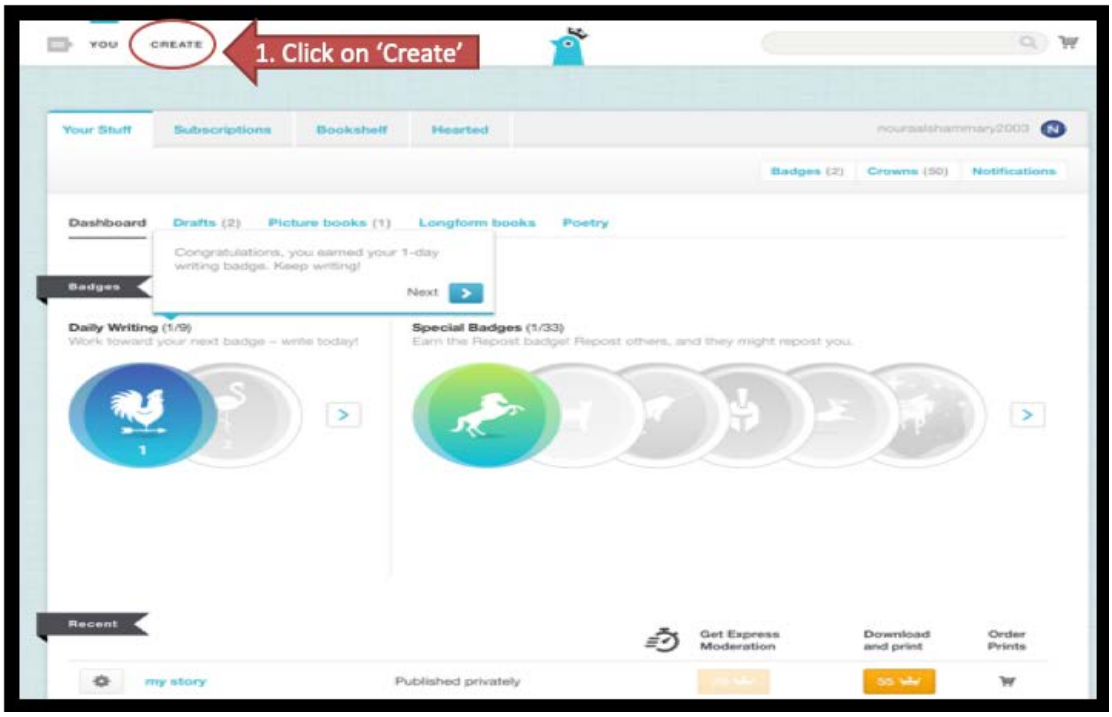
Invite Collaborator



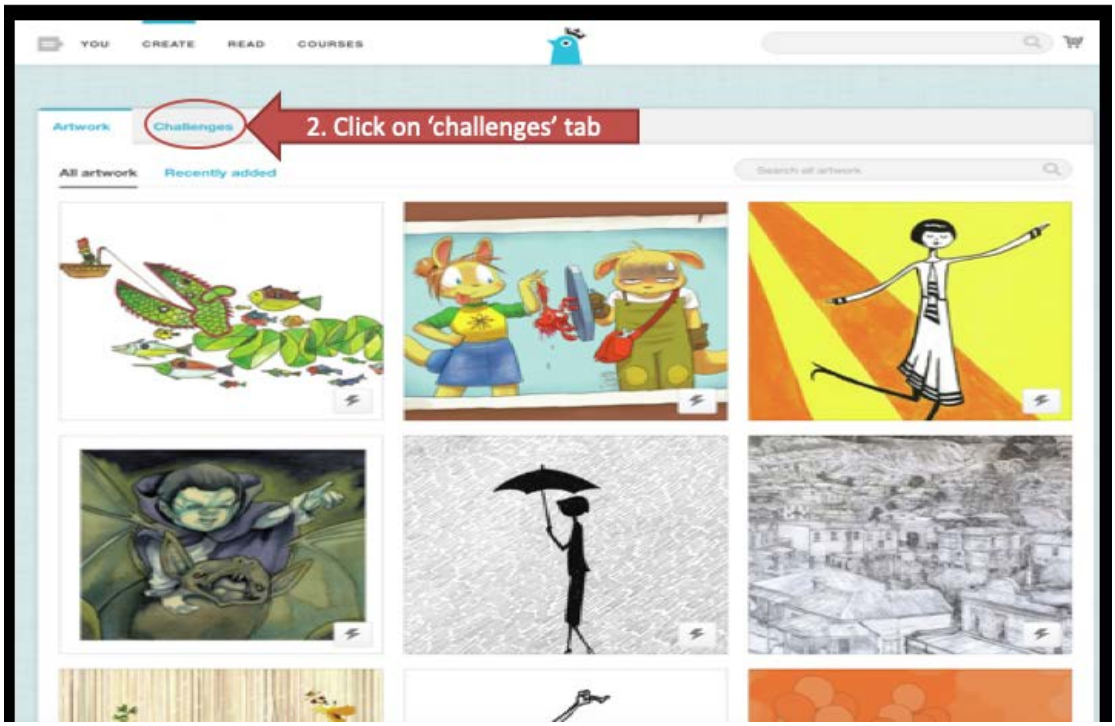
Task D

Participating in challenging task

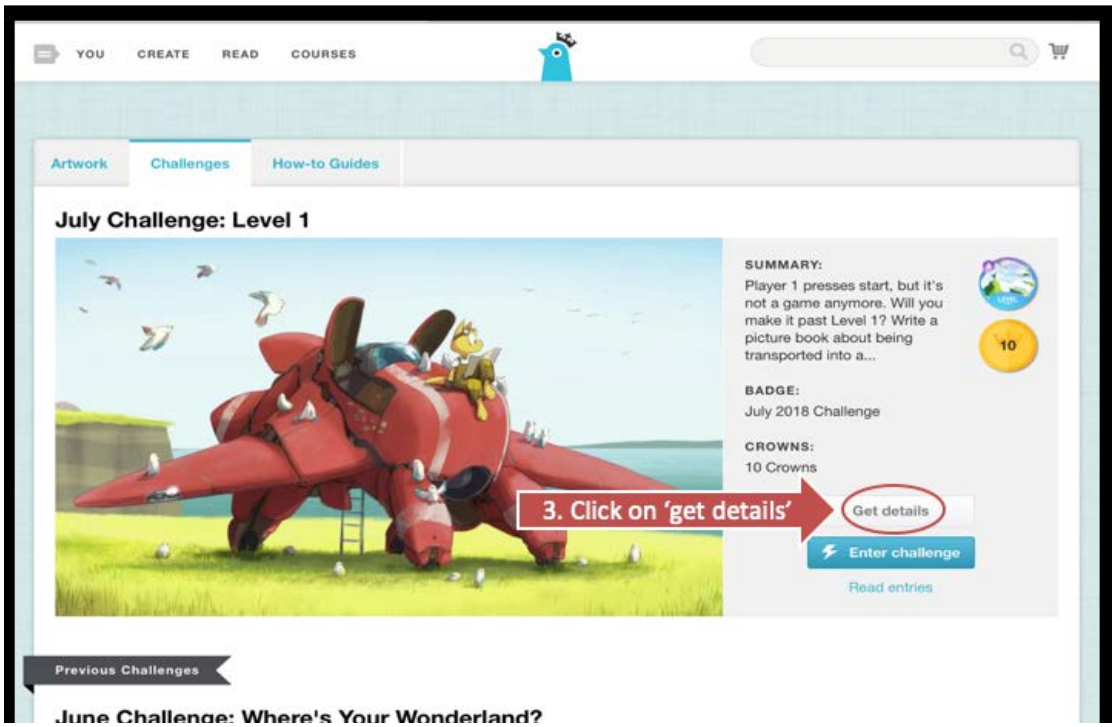
Participating in challenging task



Participating in challenging task

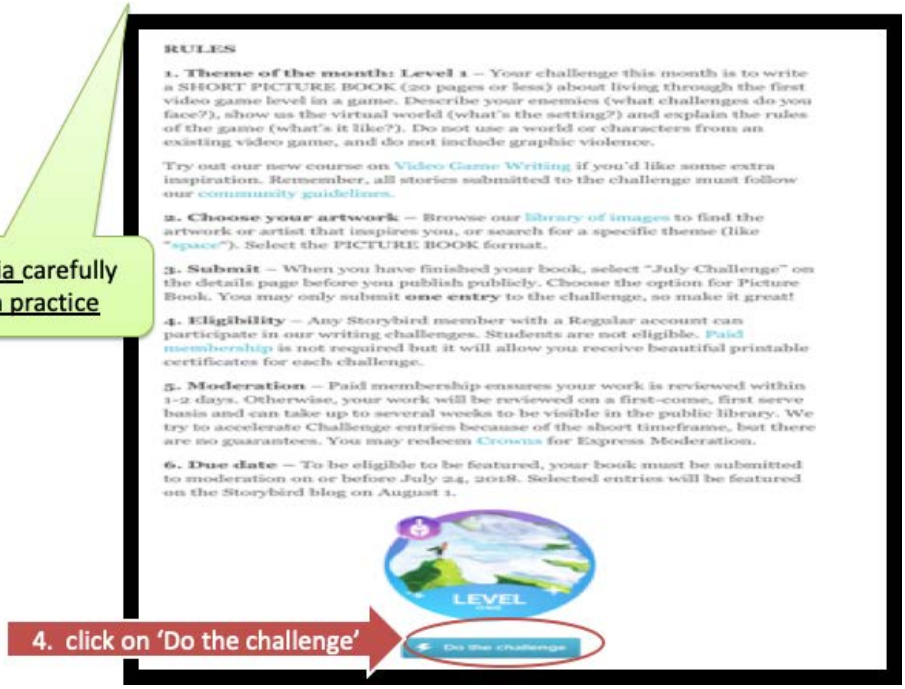


Participating in challenging task



Participating in challenging task

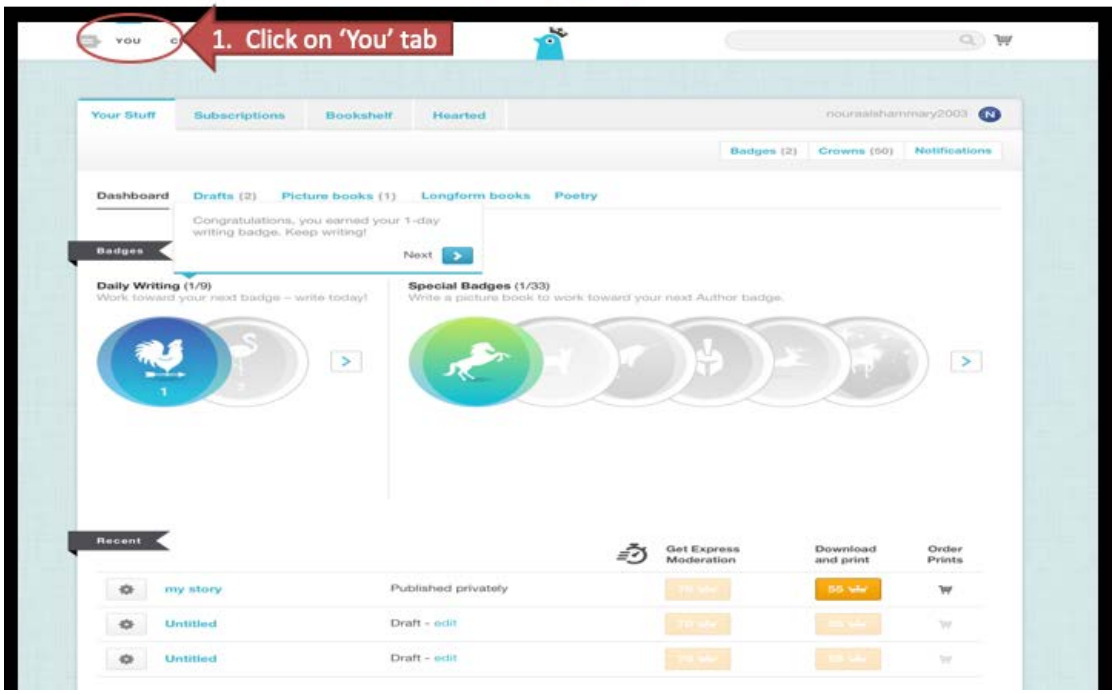
Read the criteria carefully for evaluation practice



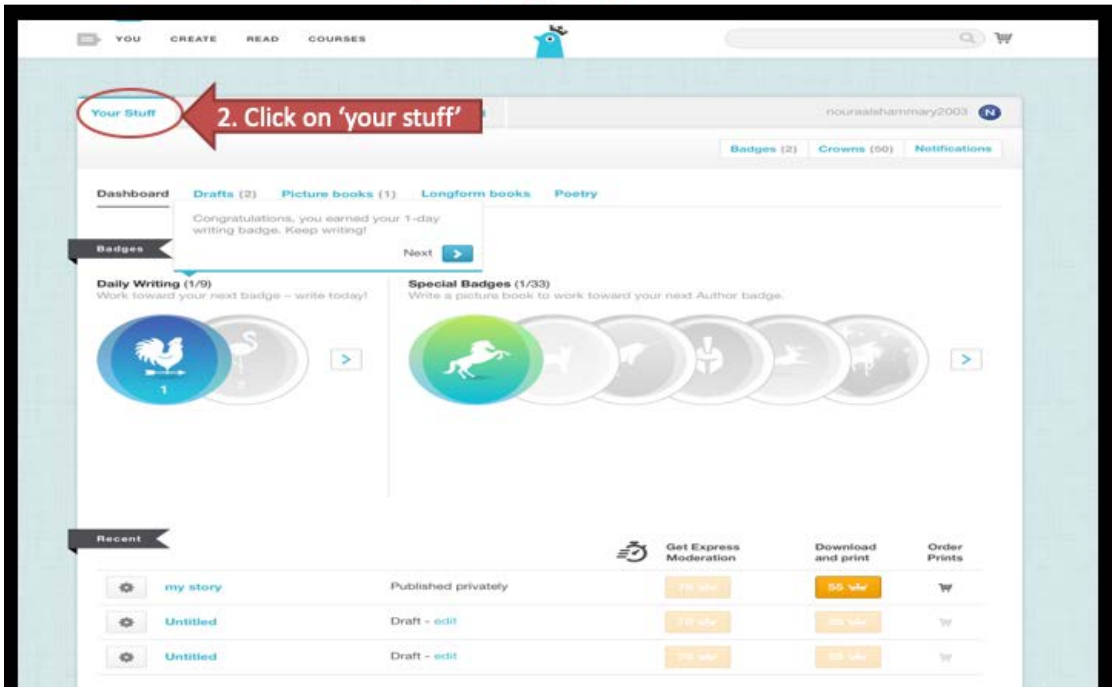
Task E

Accessing student Reinforcement (Badges- Crowns)

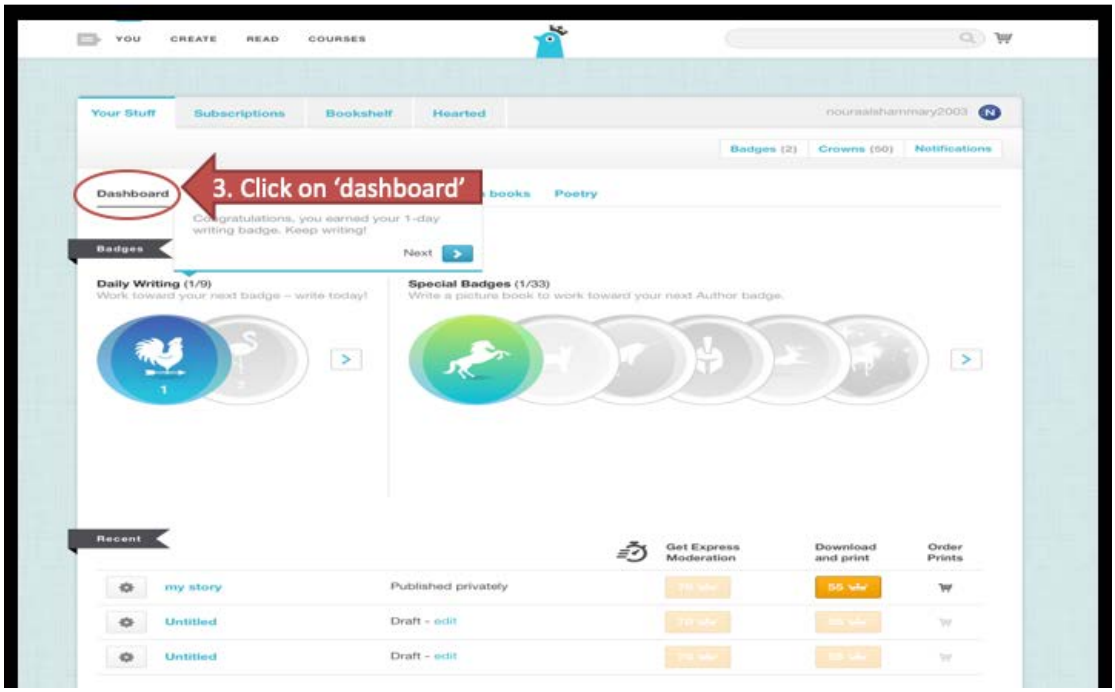
Accessing student Reinforcement (Badges)



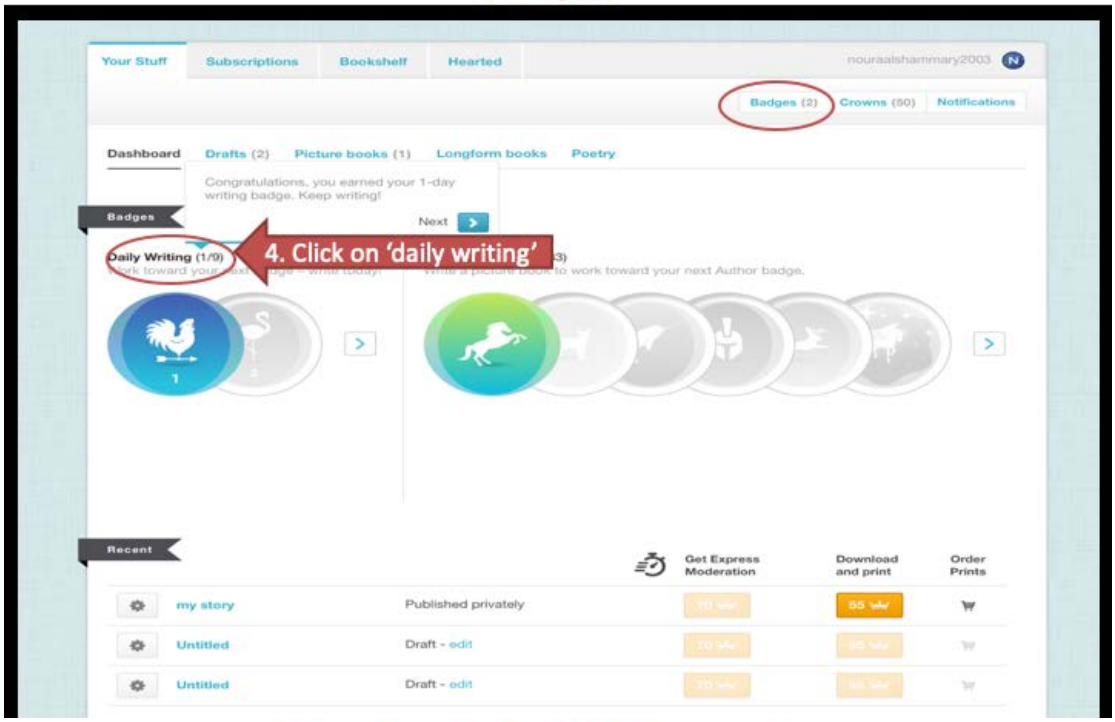
Accessing student Reinforcement (Badges)



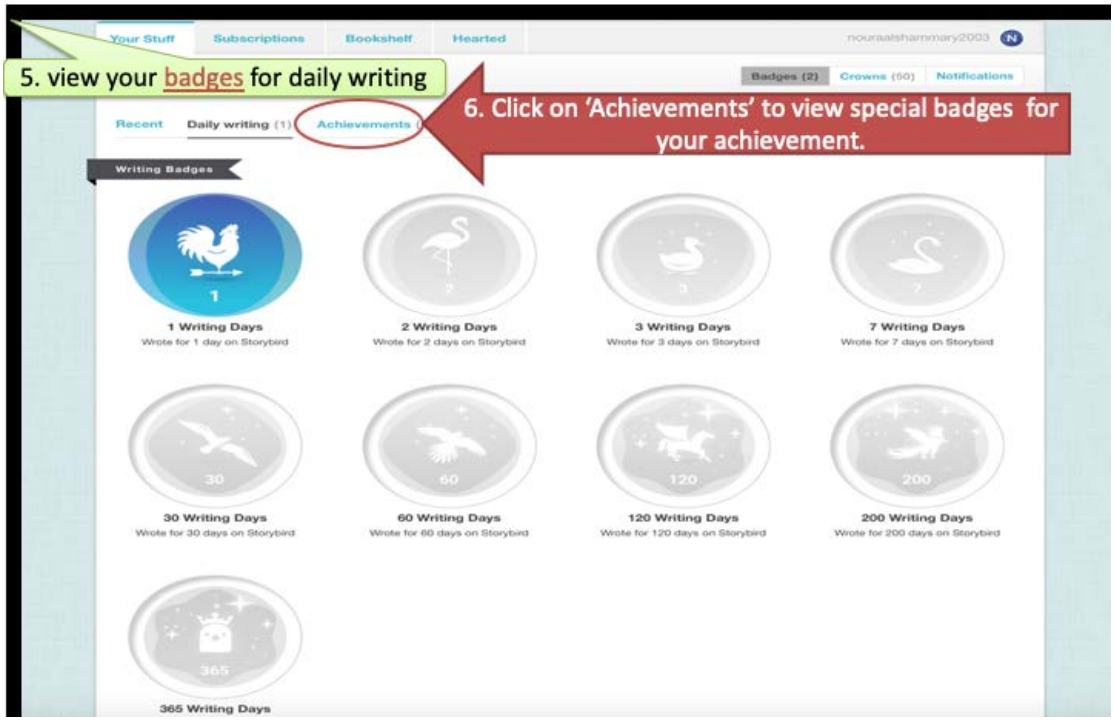
Accessing student Reinforcement (Badges)



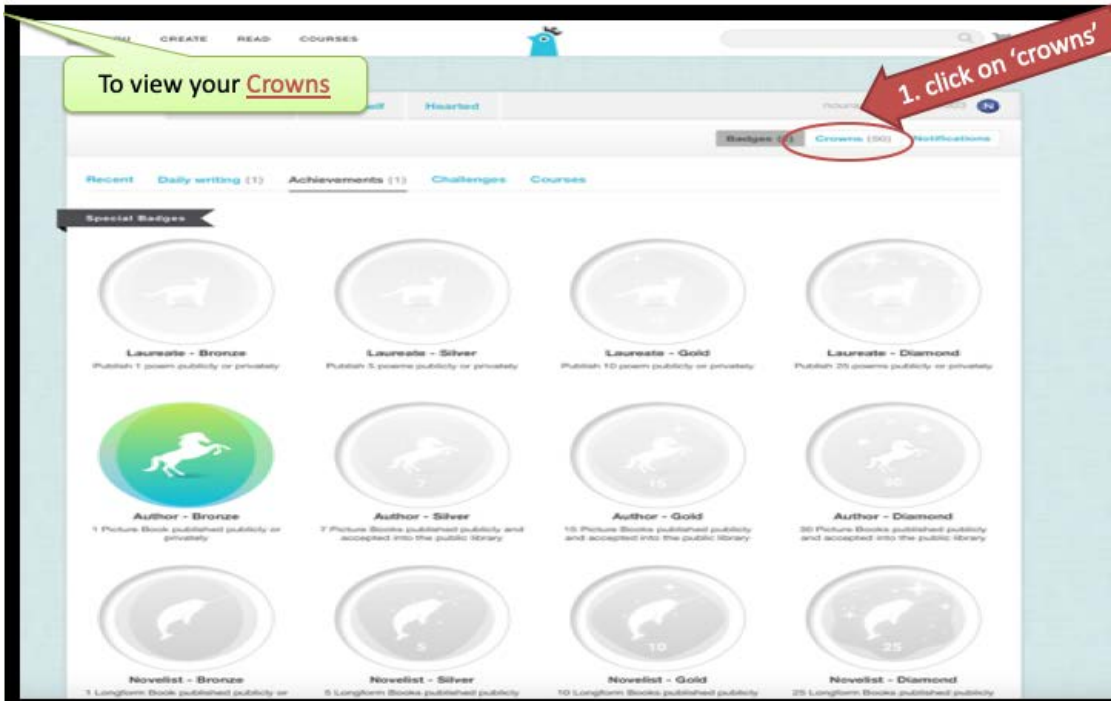
Accessing student Reinforcement (Badges)



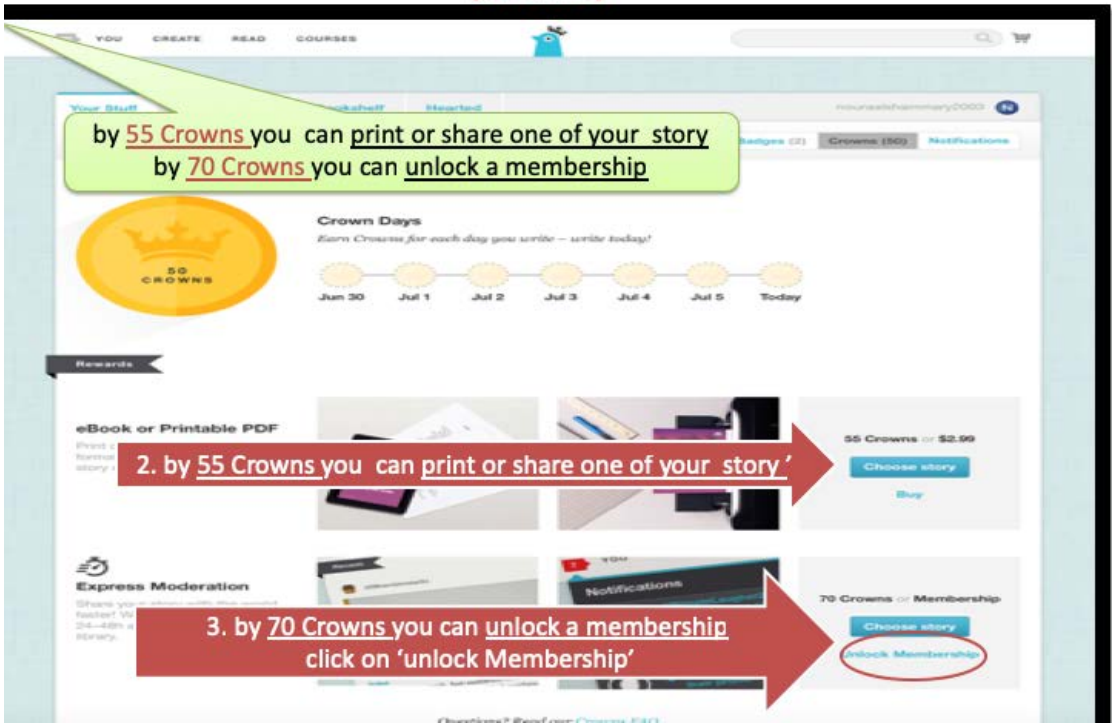
Accessing student Reinforcement (Badges)



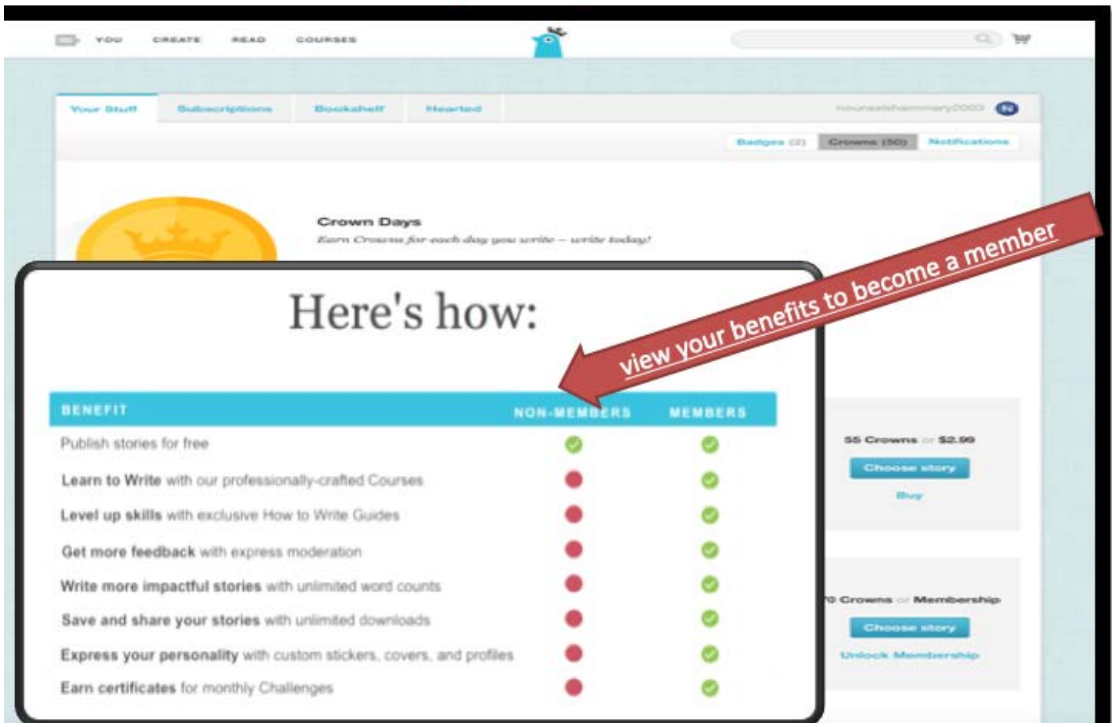
Accessing student Reinforcement (Crowns)



Accessing student Reinforcement (Crowns)



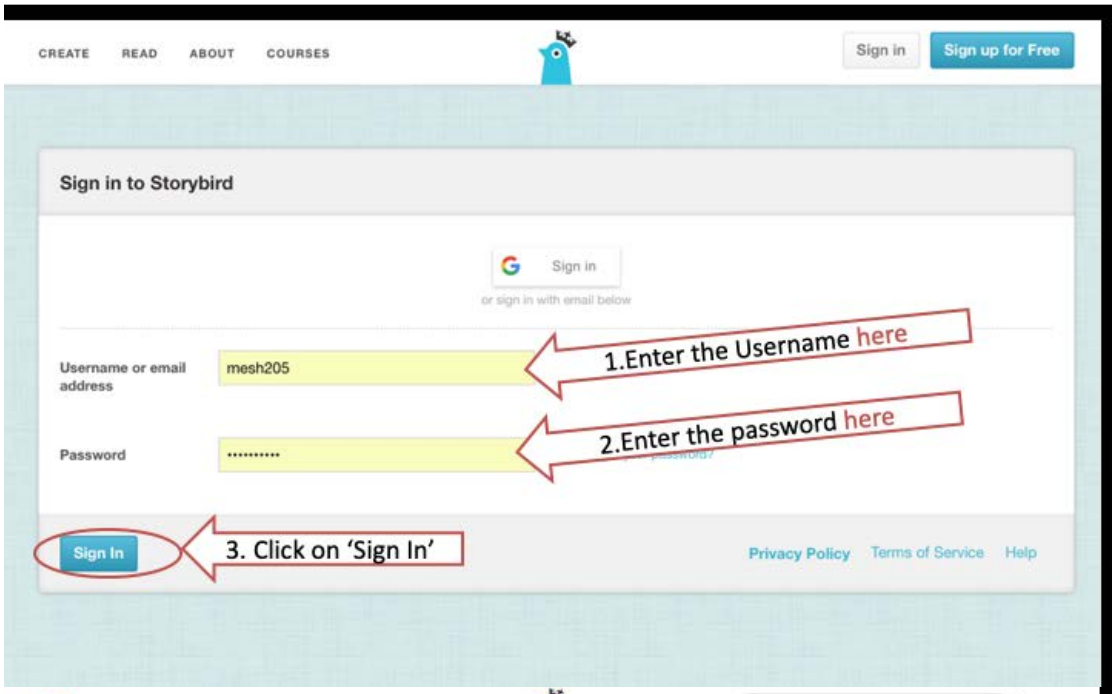
Accessing student Reinforcement (Crowns)

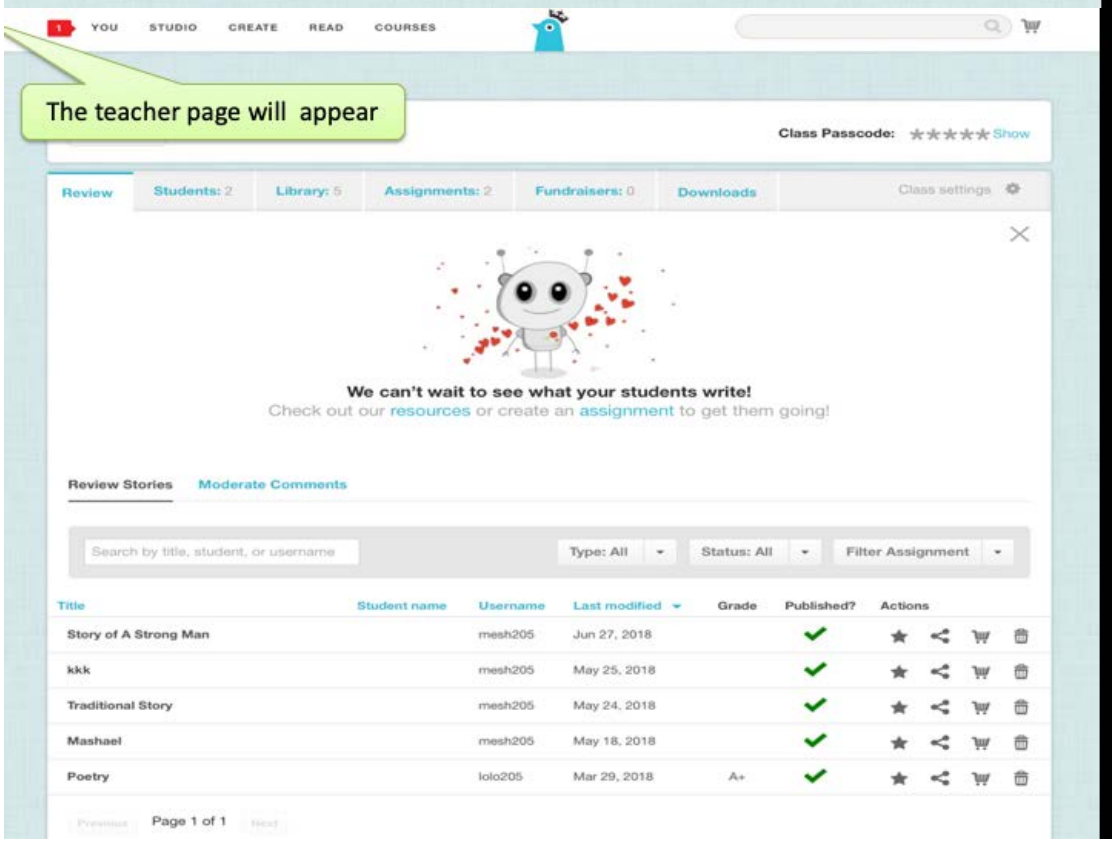


Task H

Signing in into Teacher Account

Signing in into Teacher Account

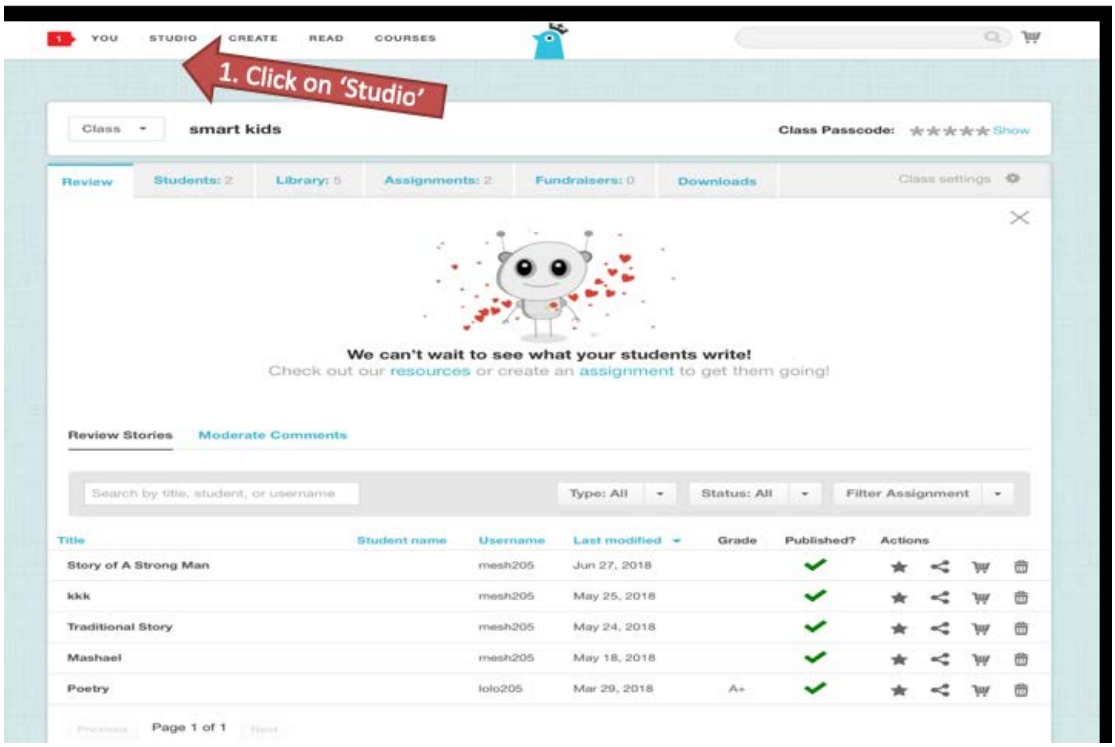




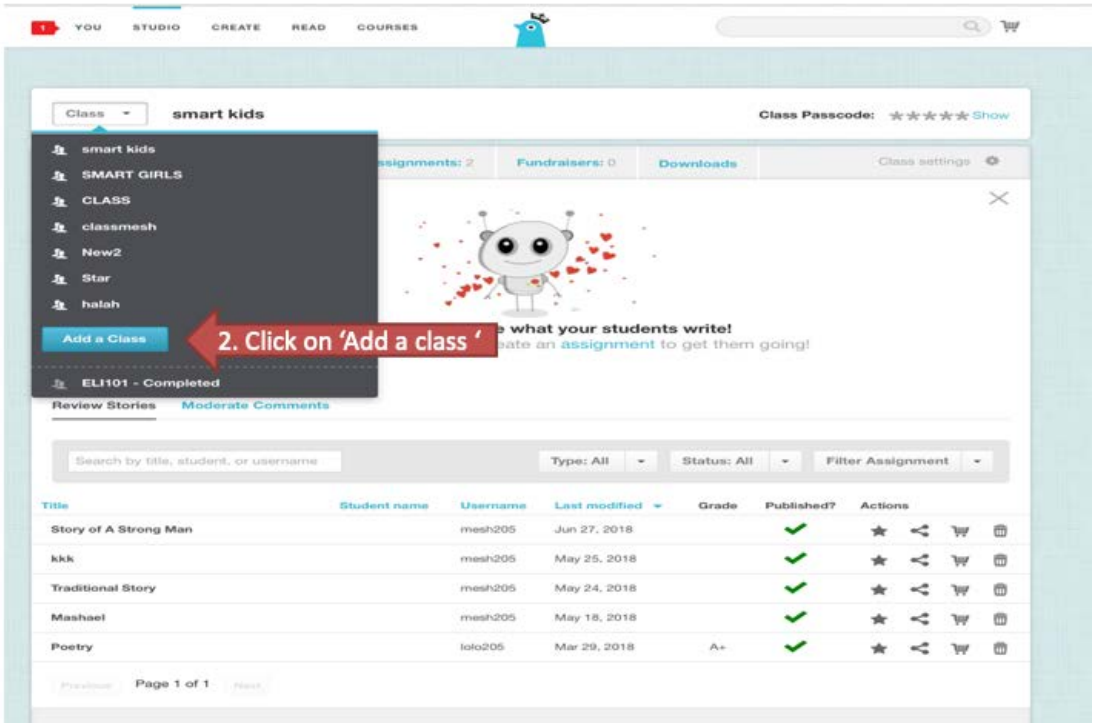
Task I

Creating a New Class

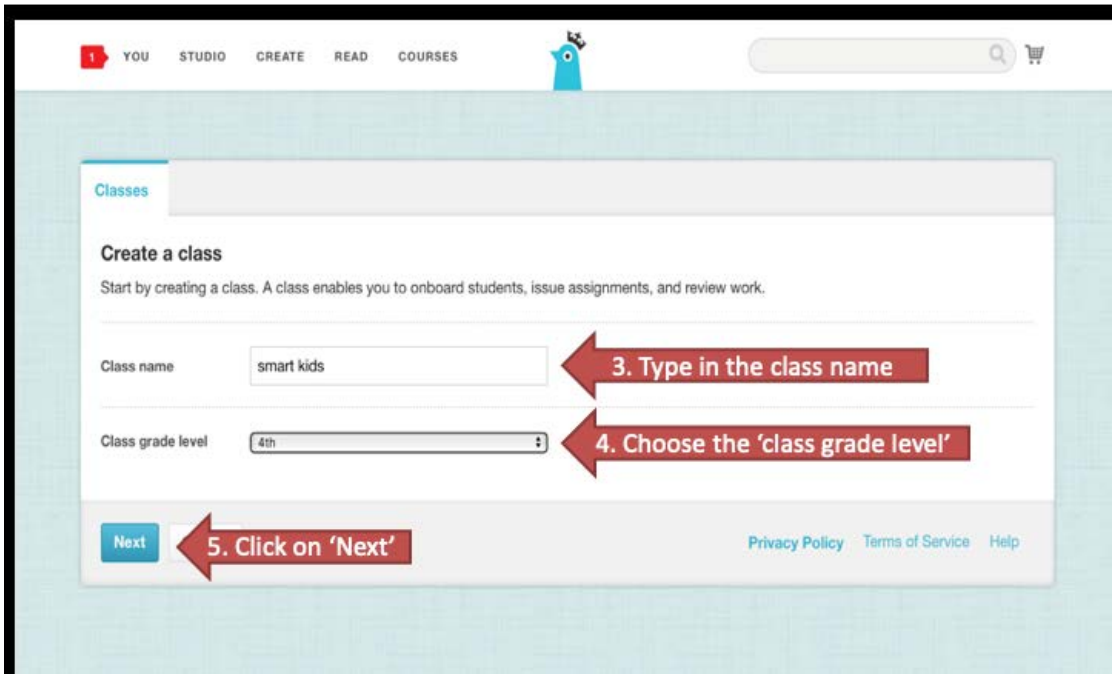
Creating a New Class



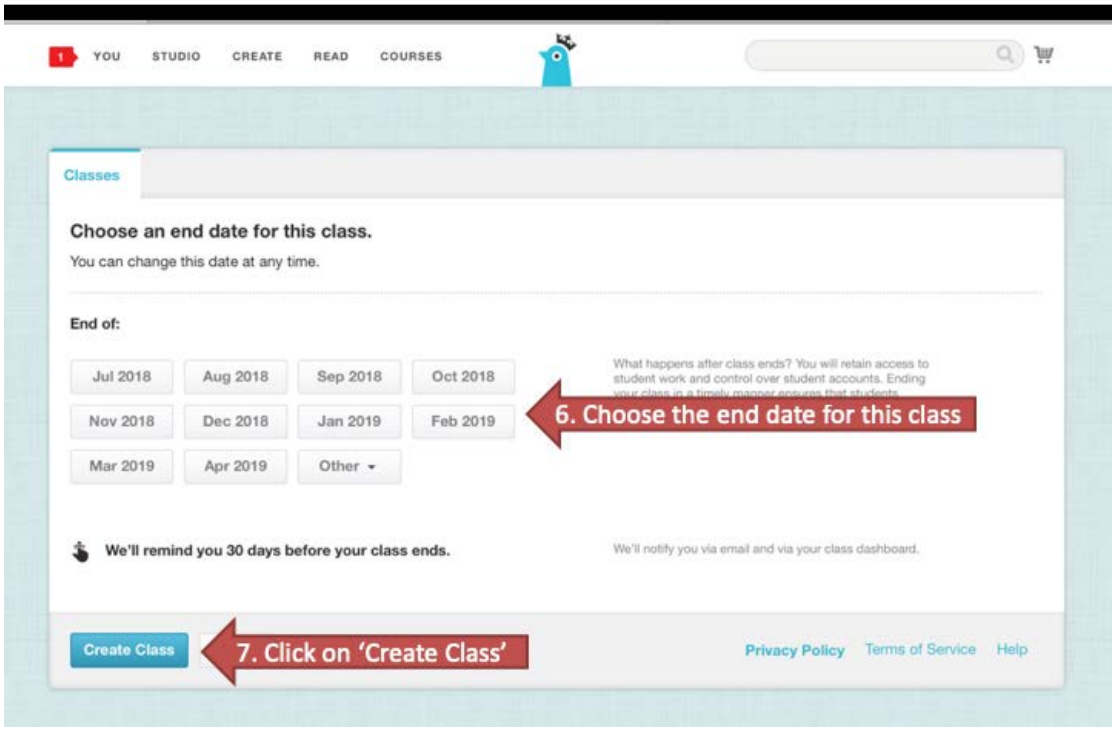
Creating a New Class



Creating a New Class



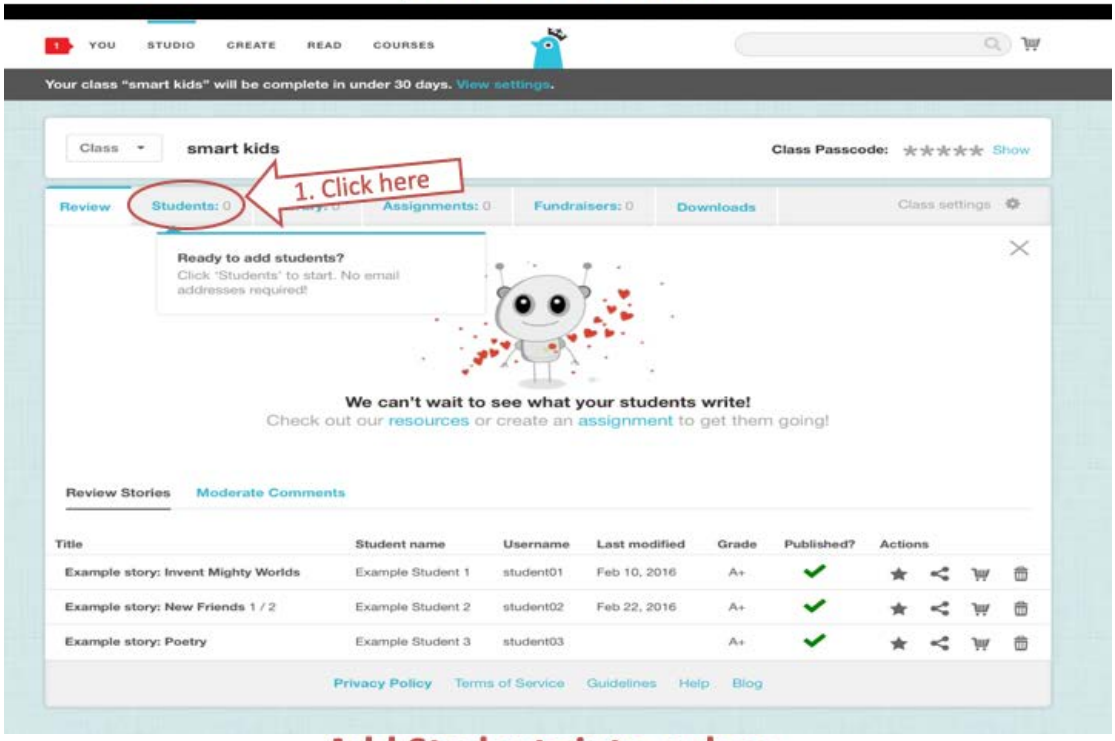
Creating a New Class



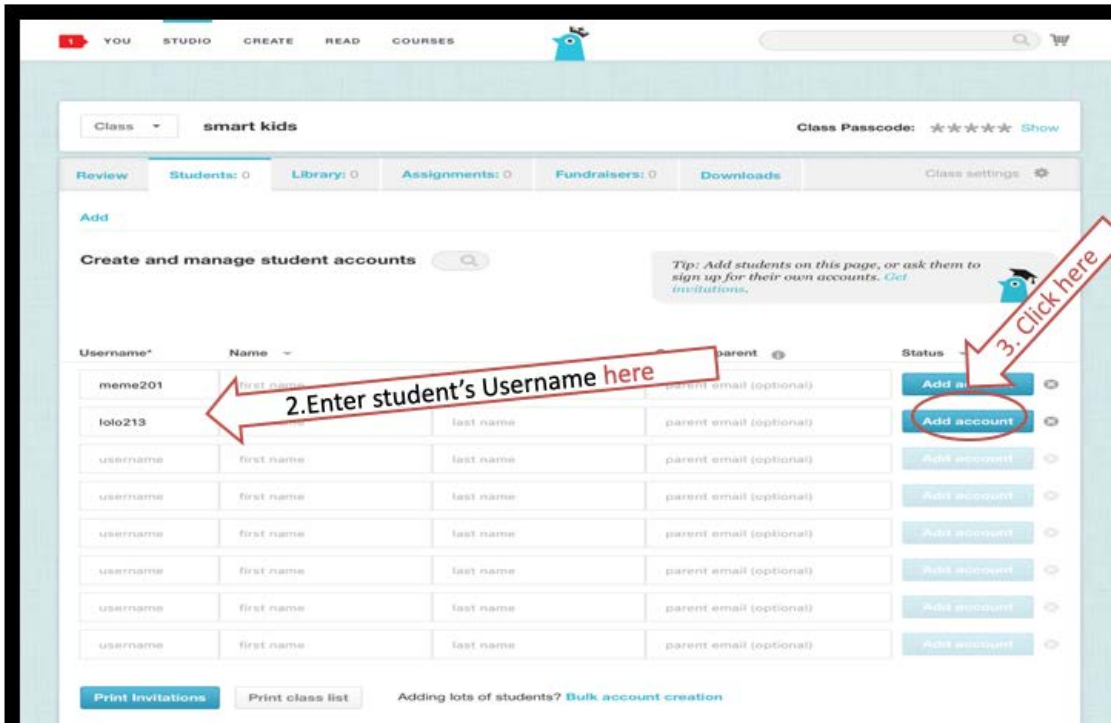
Task J

Add Students into a class (small number- large number)

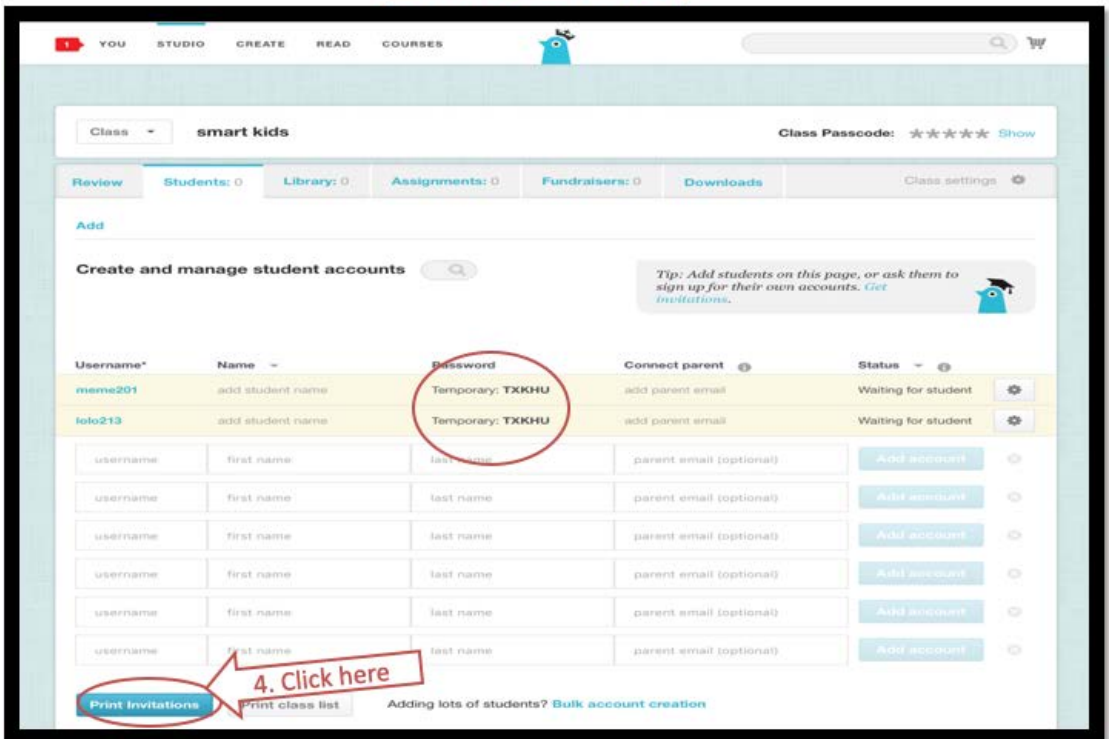
Add Students into a class (limited number)



Add Students into a class (limited number)



Add Students into a class (Limited number)



Teacher can print invitations for both

If student has account

Dear Student,

You will be using Storybird to write stories with beautiful artwork as inspiration. Please sign up and join the class:

1. Go to Storybird.com and click the Sign up button
2. Create a student account
3. Create a username and password.
4. Enter the Class Passcode: **TXKHU**

See you soon!

P.S. Show this to your parents:

Parents: Connect to your child at **storybird.com/parents** using Class Passcode: **TXKHU**. Connecting lets you view their classwork, and save their stories to a personal account when class is over so they can keep writing!

If student does not has account

Dear Student,

You will be using Storybird to write stories with beautiful artwork as inspiration. Please sign in and join the class:

1. Go to Storybird.com and click 'Sign in'
2. Enter the username your teacher gave you.
3. Enter the temporary password: **TXKHU**

See you soon!

P.S. Show this to your parents:

Parents: Connect to your child at **storybird.com/parents** using Class Passcode: **TXKHU**. Connecting lets you view their classwork, and back up their stories to a personal account when class is over so they can keep writing!

student username

Teacher can also print invitations for Parents

storybird

Dear Student,

You will be using Storybird to write stories with beautiful artwork as inspiration. Please sign up and join the class:

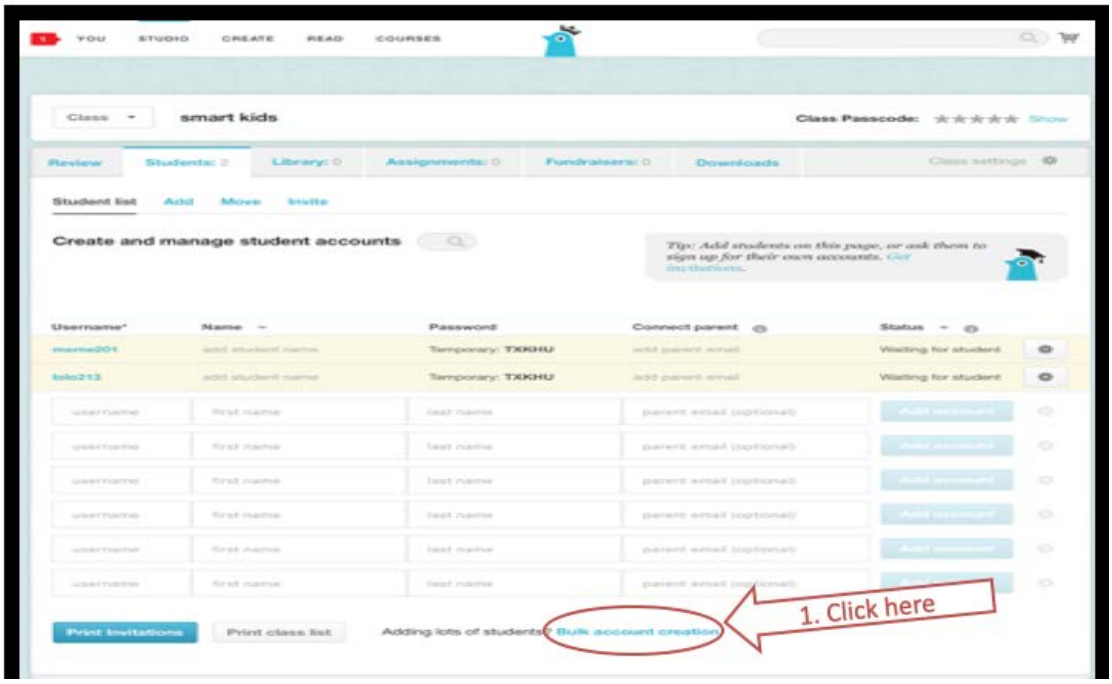
1. Go to Storybird.com and click the Sign up button
2. Create a student account
3. Create a username and password.
4. Enter the Class Passcode: **TXKHU**

See you soon!

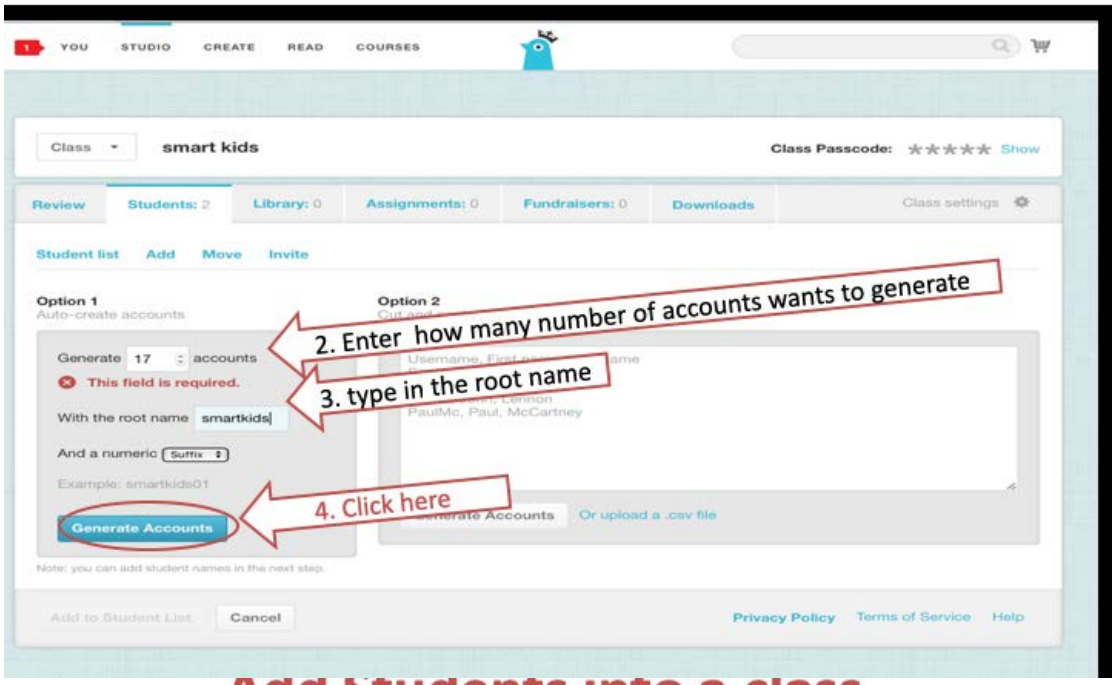
P.S. Show this to your parents:

Parents: Connect to your child at **storybird.com/parents** using Class Passcode: **TXKHU**. Connecting lets you view their classwork, and save their stories to a personal account when class is over so they can keep writing!

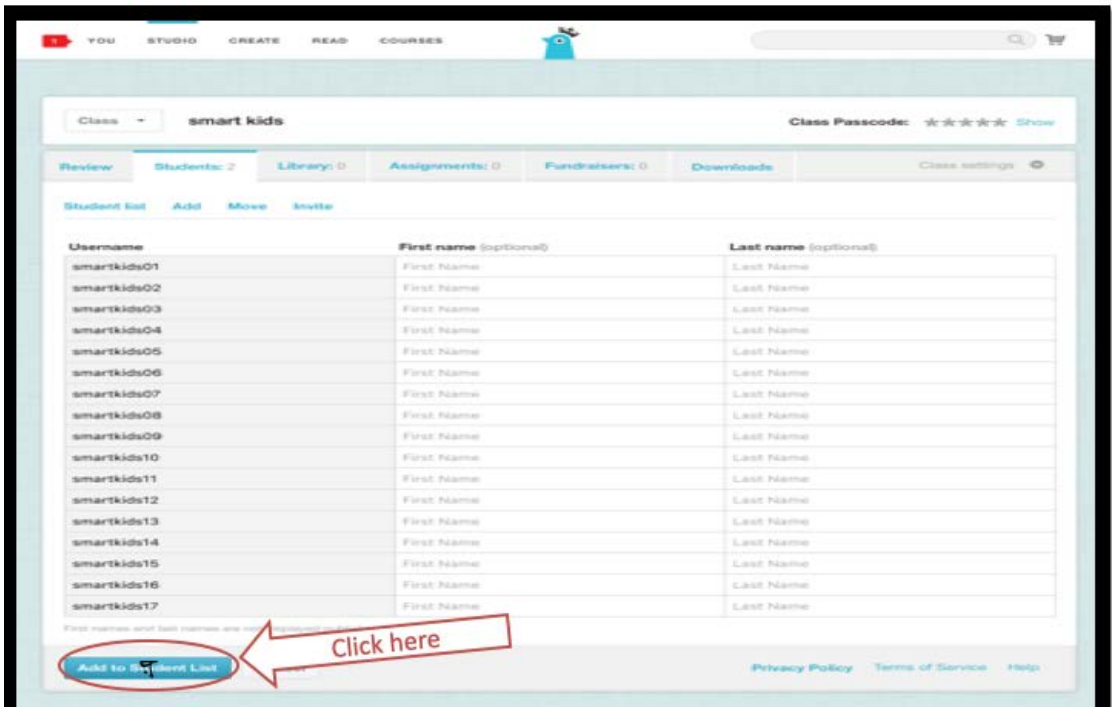
Add Students into a class (Large number)



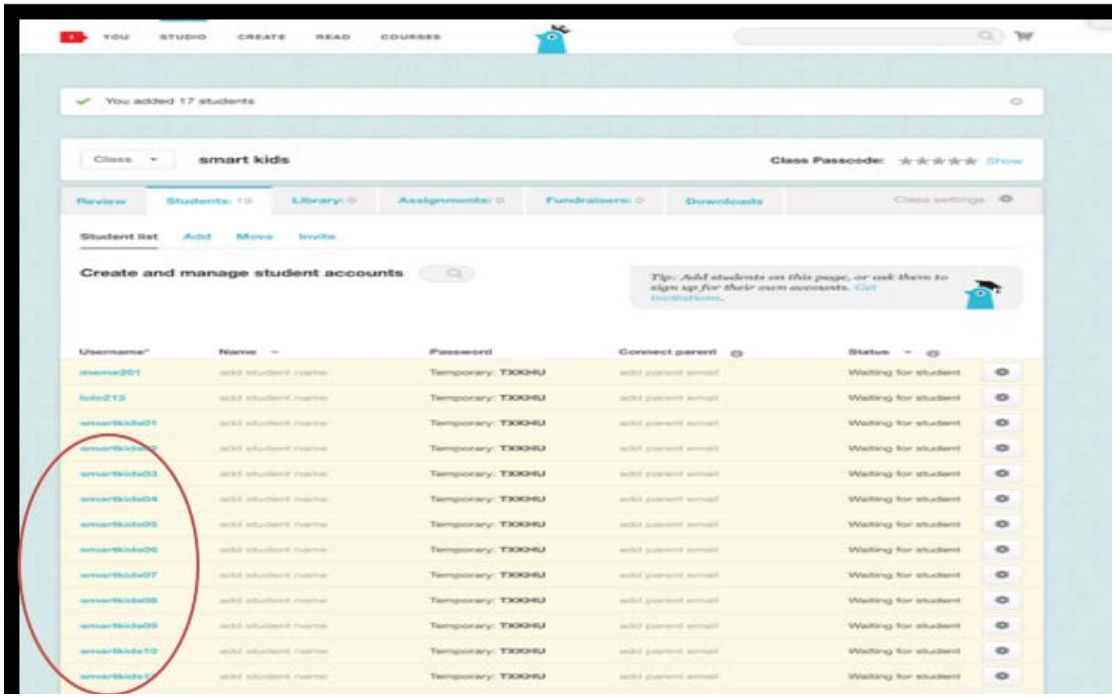
Add Students into a class (Large number)



Add Students into a class (Large number)



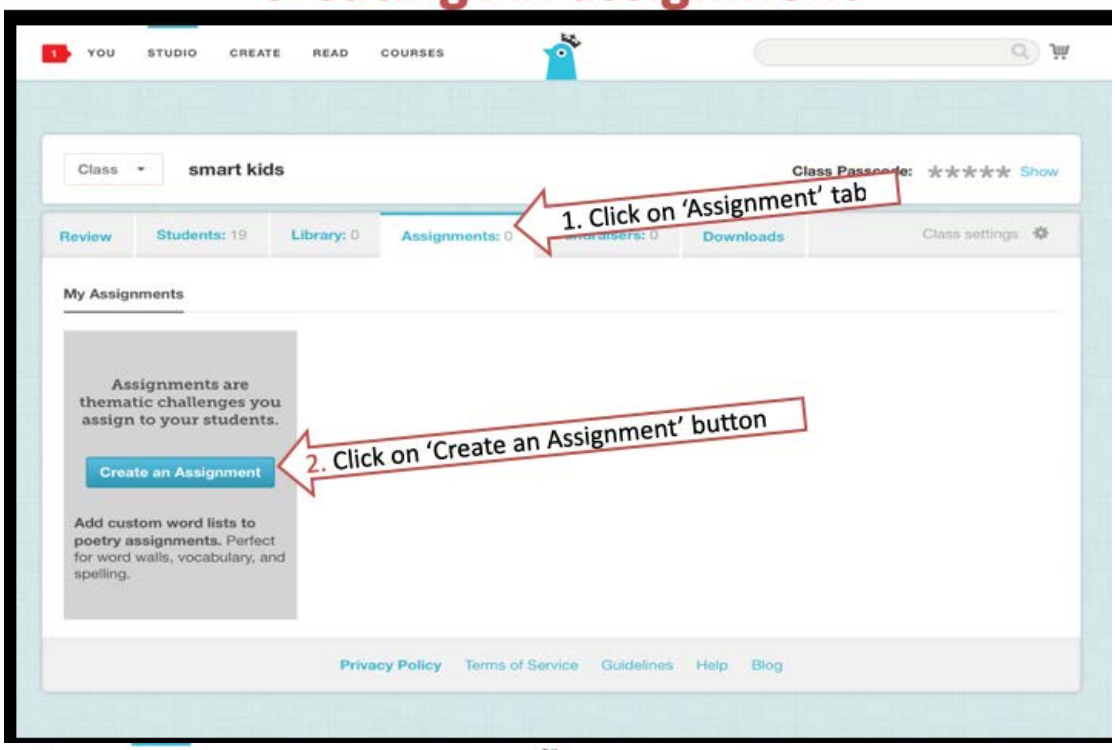
Add Students into a class (Large number)

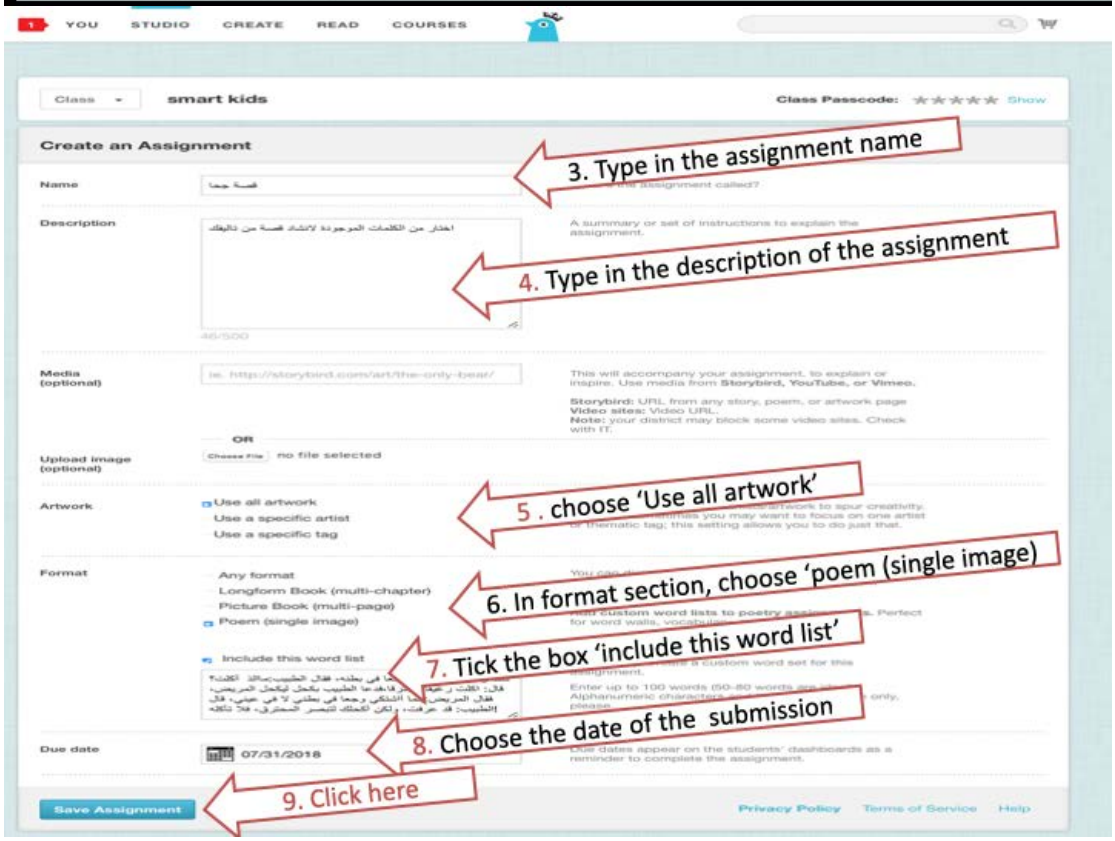


Task K

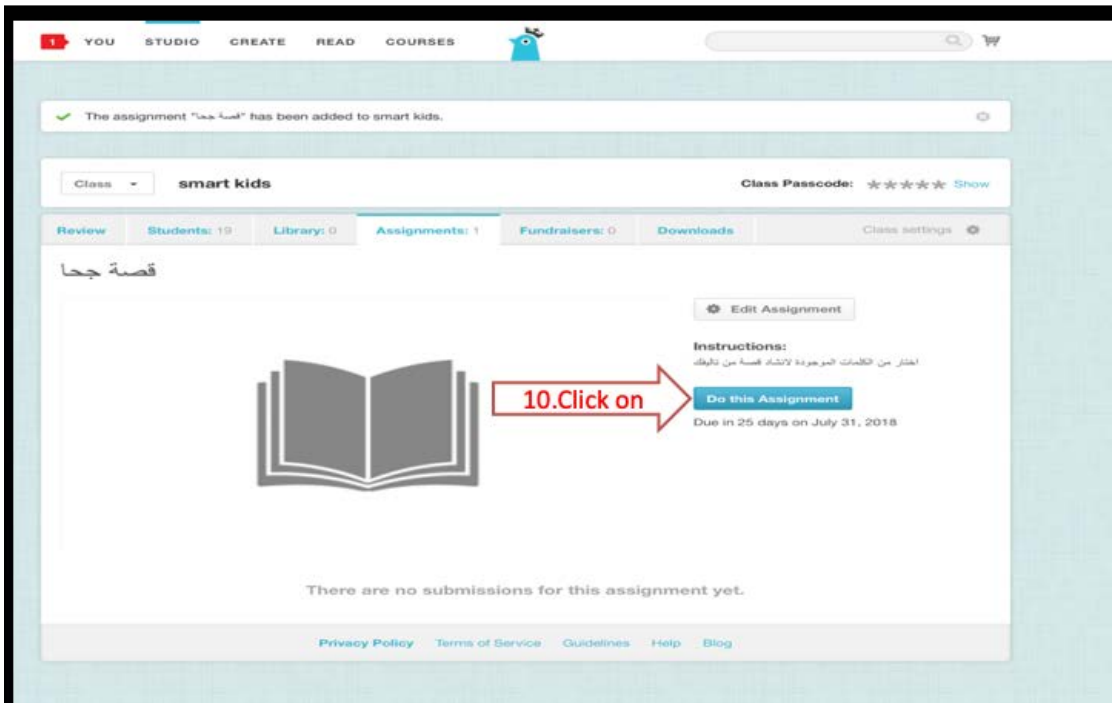
Creating and Editing An assignment

Creating An assignment





Creating An assignment



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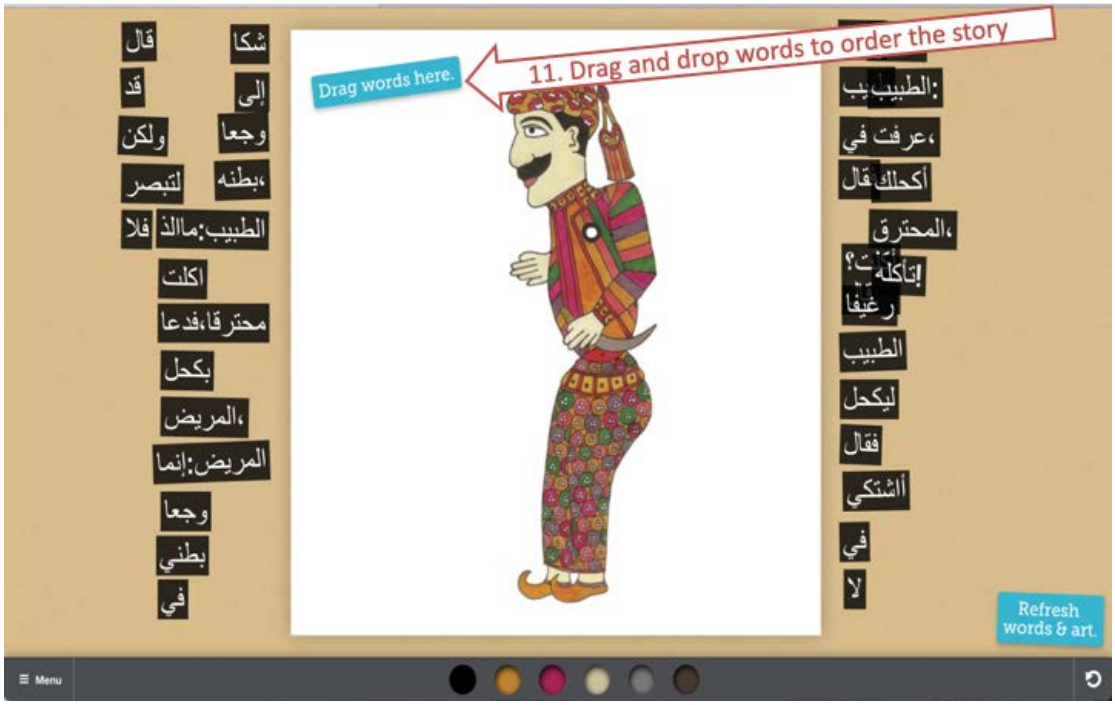
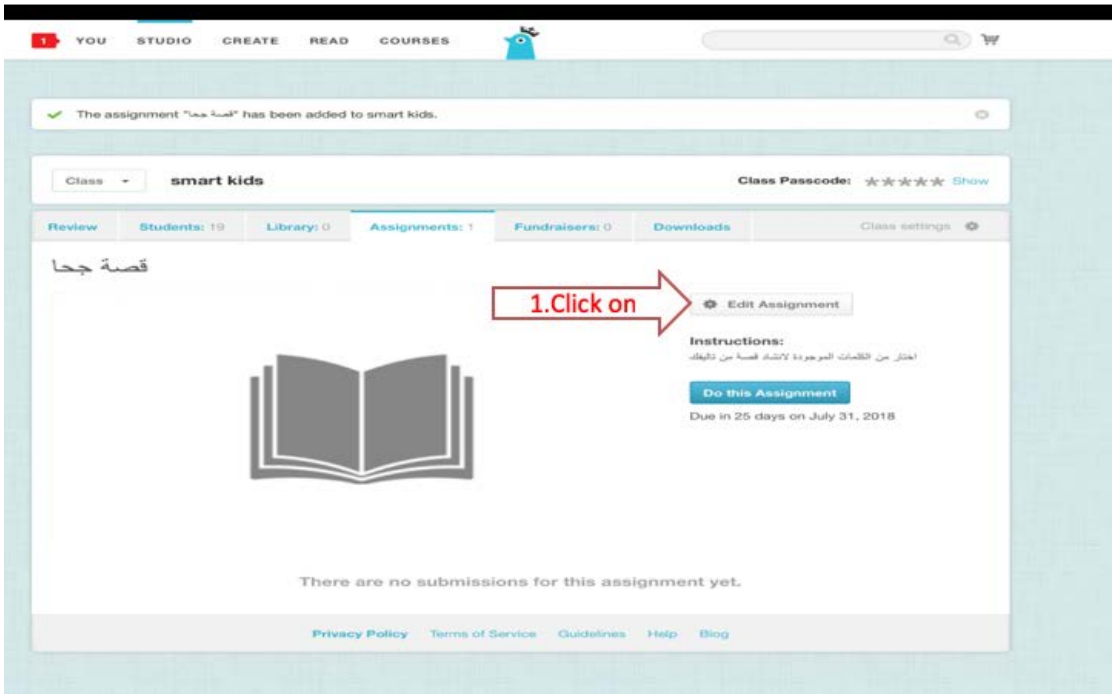


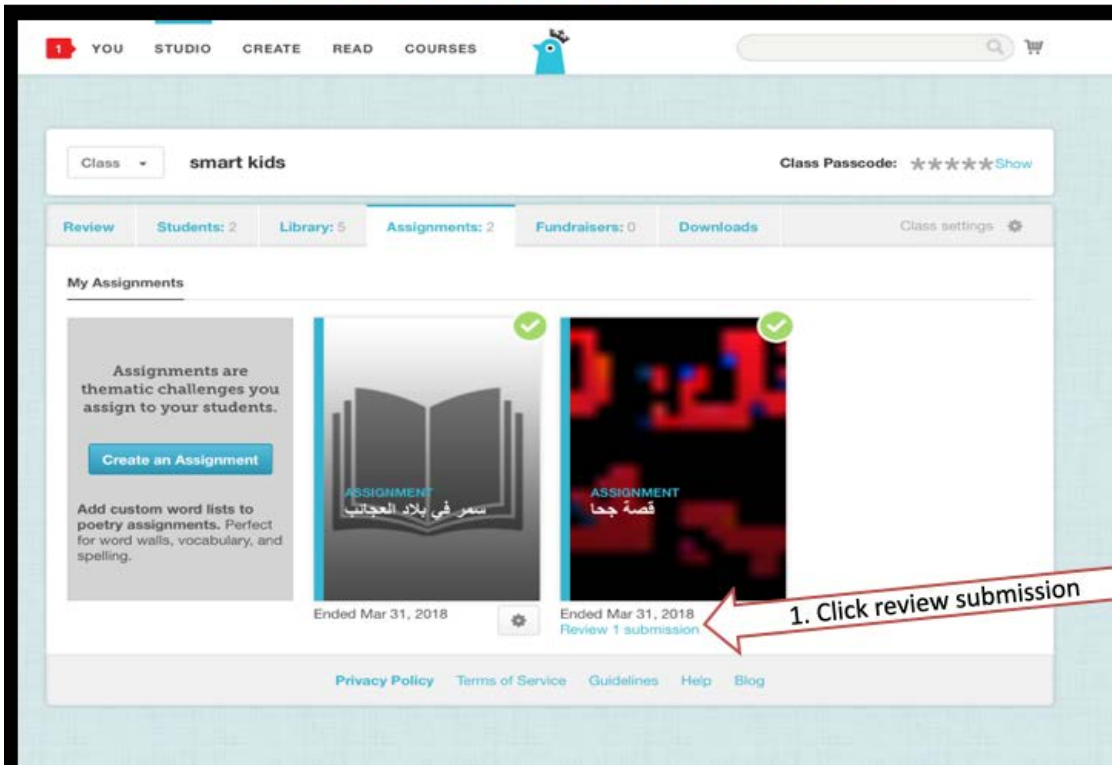
Creating An assignment

Editing an Assignment

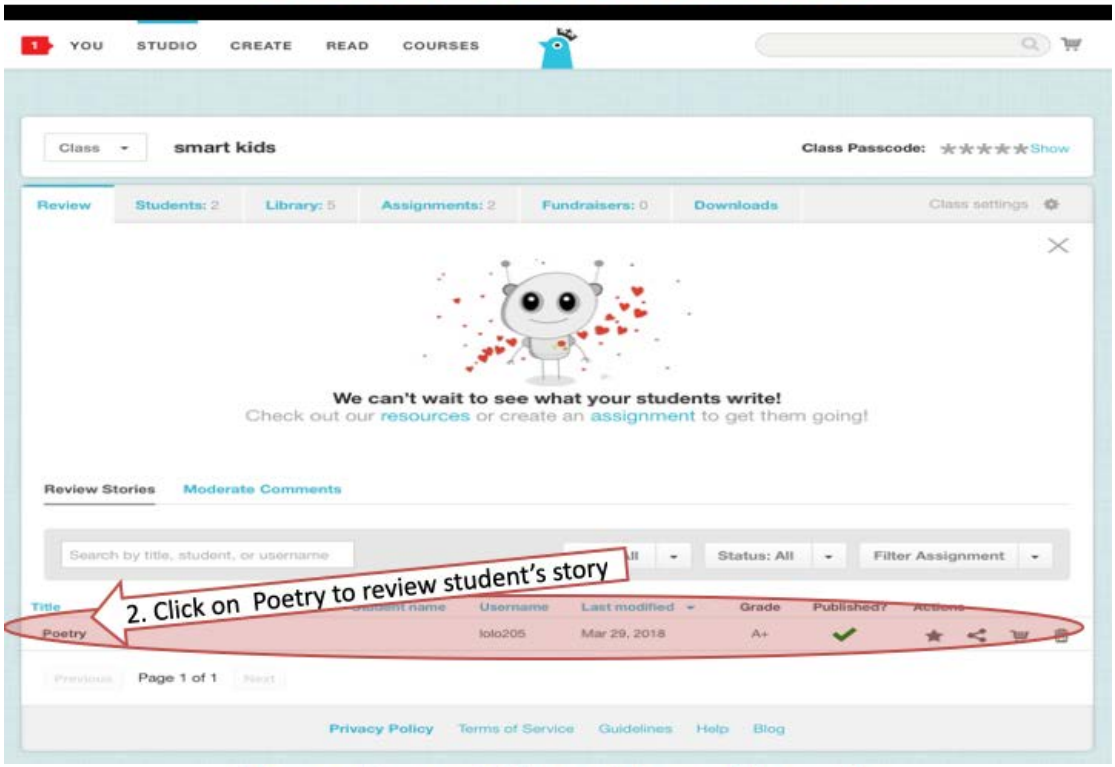


Task L:
Teacher Give Feedback, Rewards and Share children work

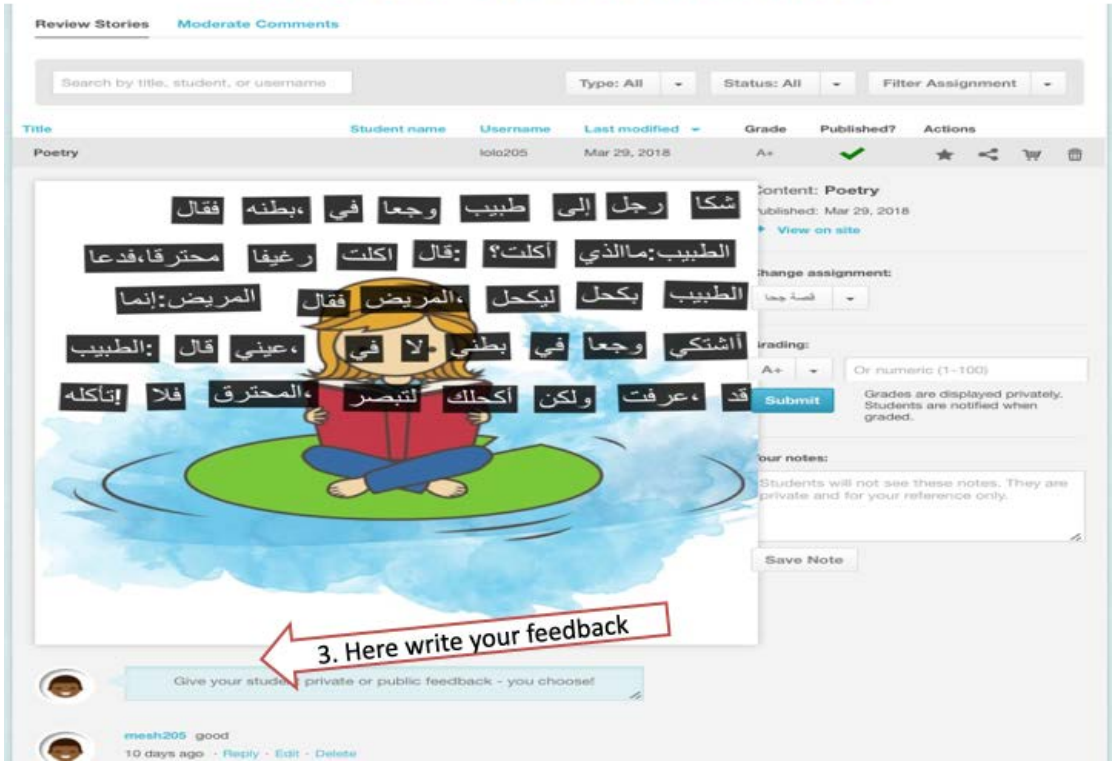
Teacher Give Feedback



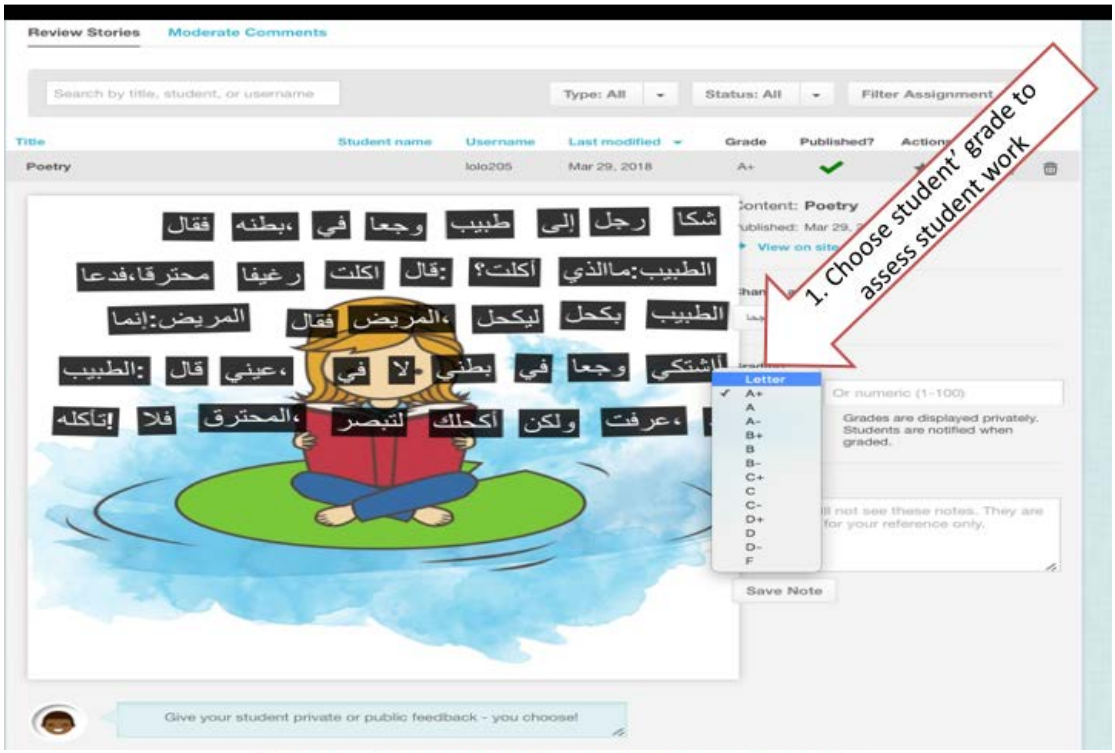
Teacher Give Feedback



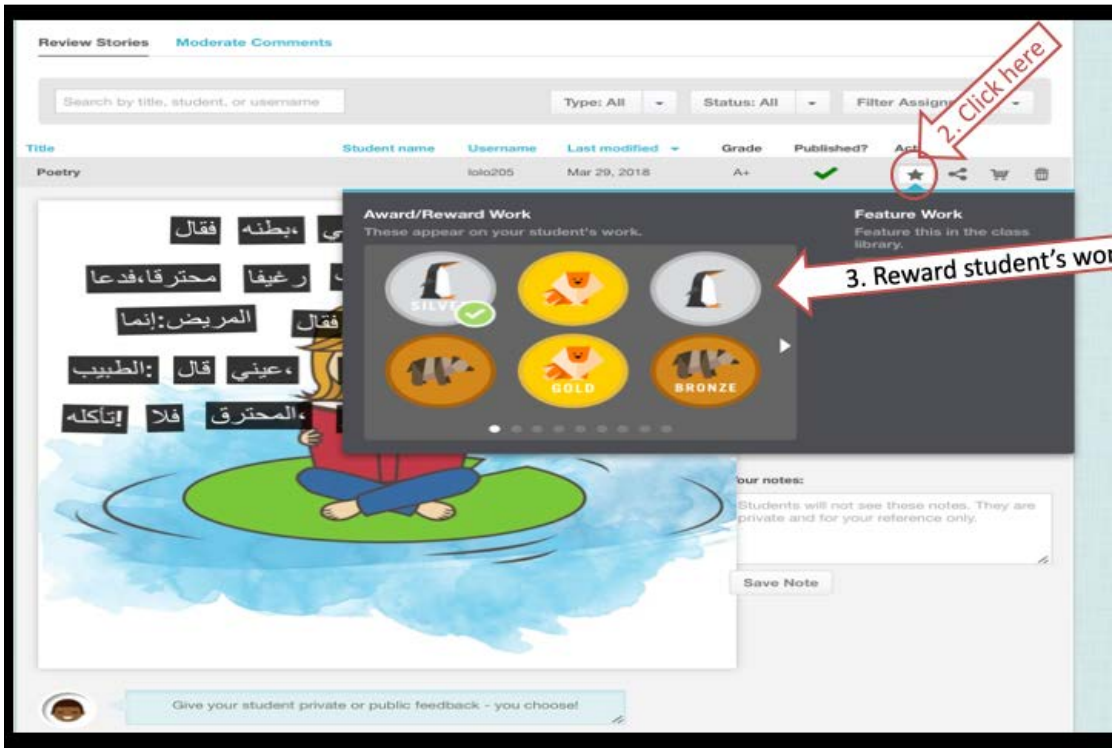
Teacher Give Feedback



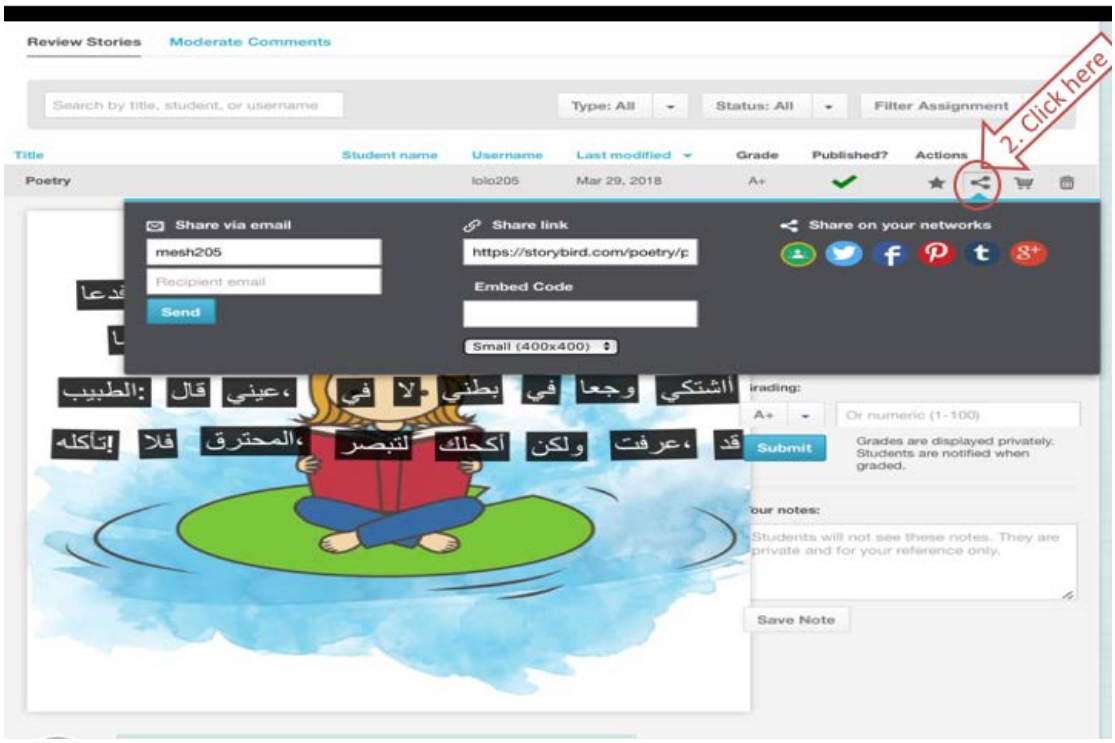
Teacher Give Rewards



Teacher Give Rewards



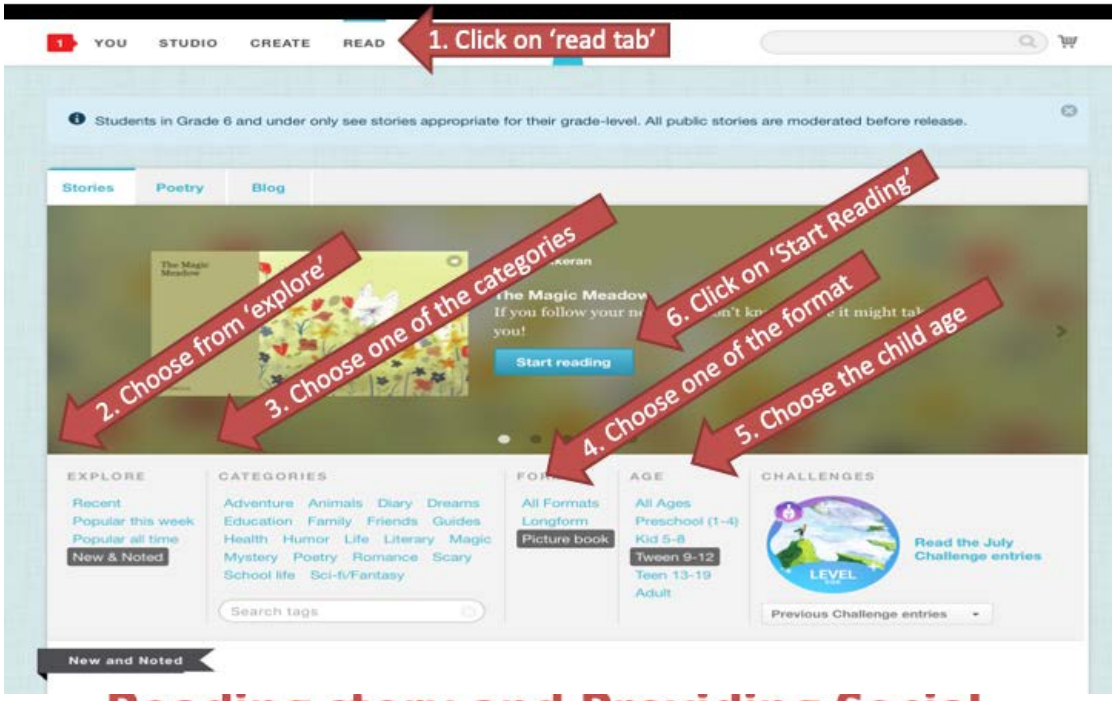
Teacher Share children' work



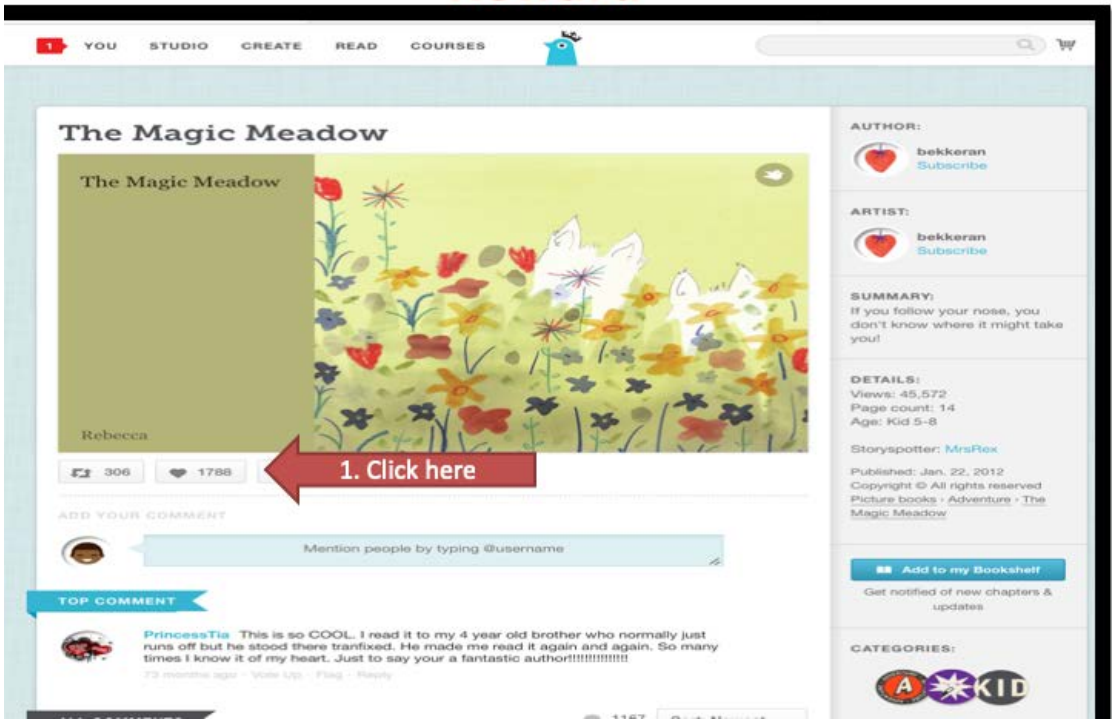
Task M

Reading any stories and providing social reward

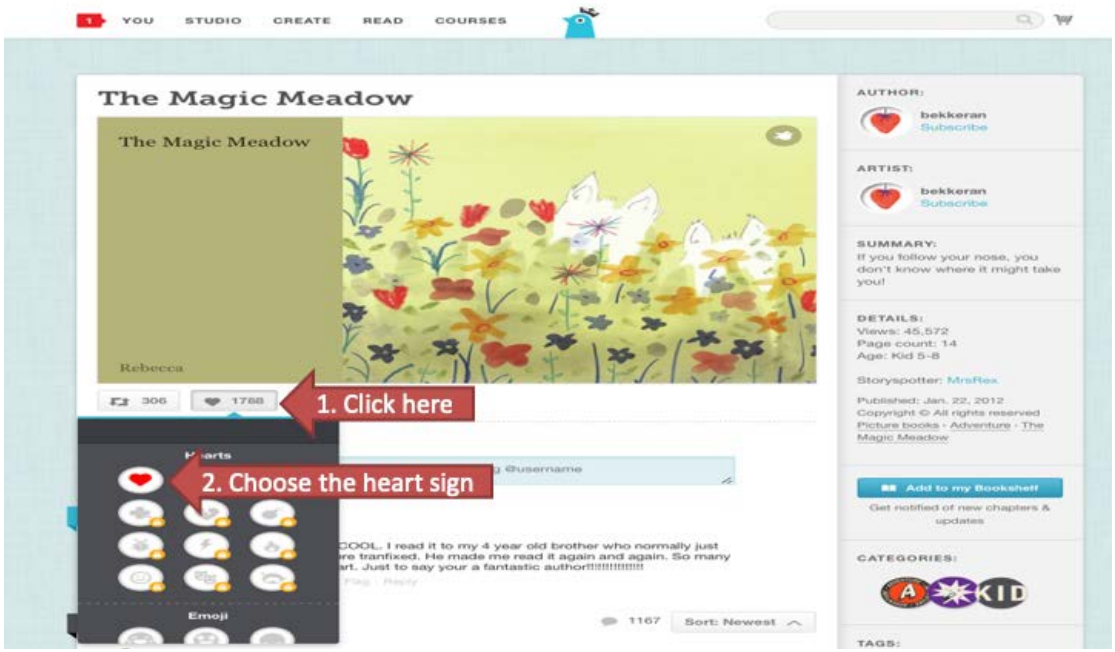
Reading any stories



Reading story and Providing Social Reward



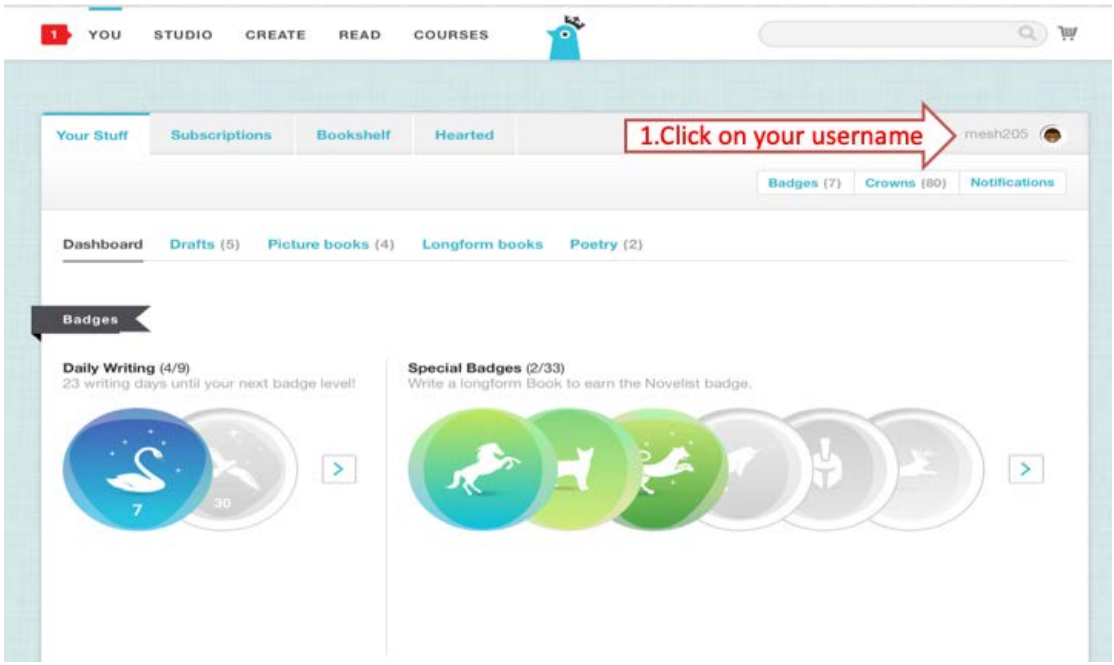
Reading story and Providing Social Reward



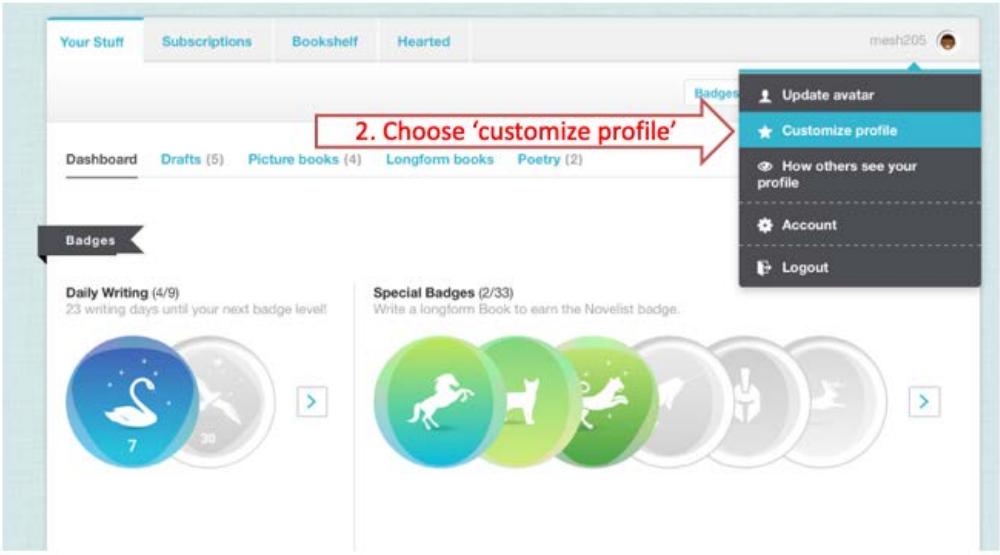
Task N

Customizing User profile and Choosing your avatar

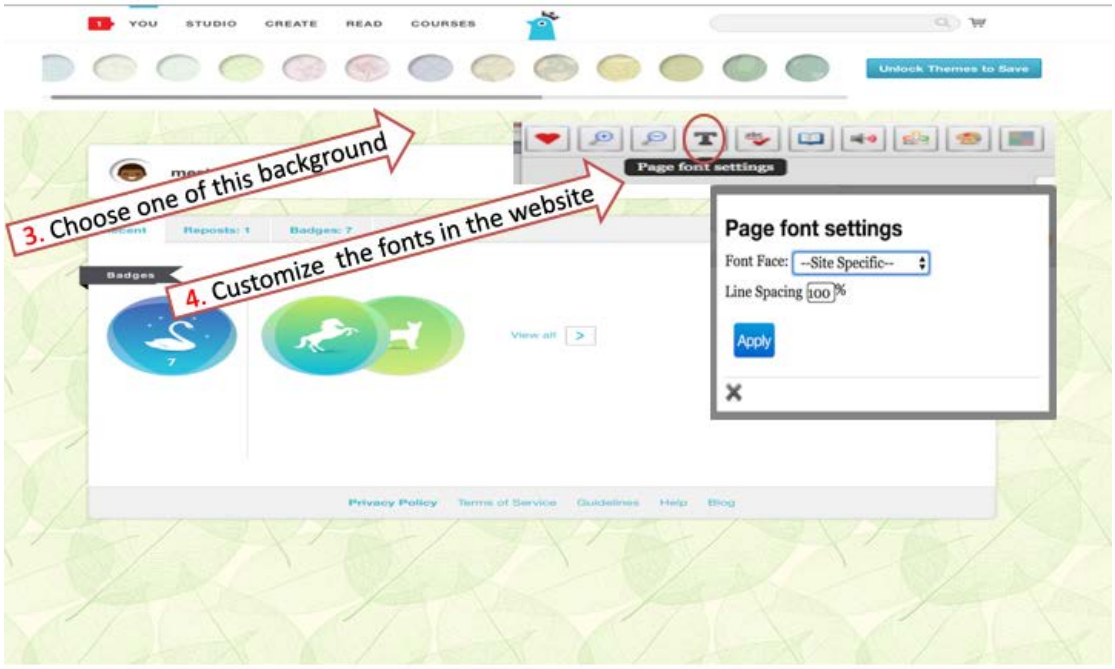
Customizing User profile



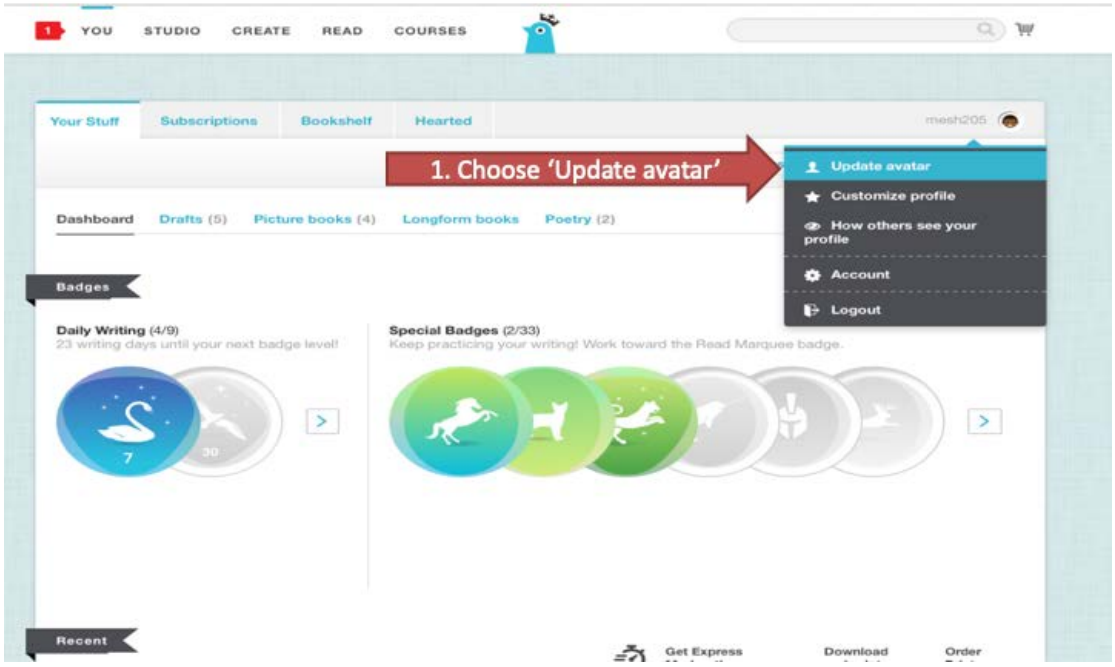
Customizing User profile



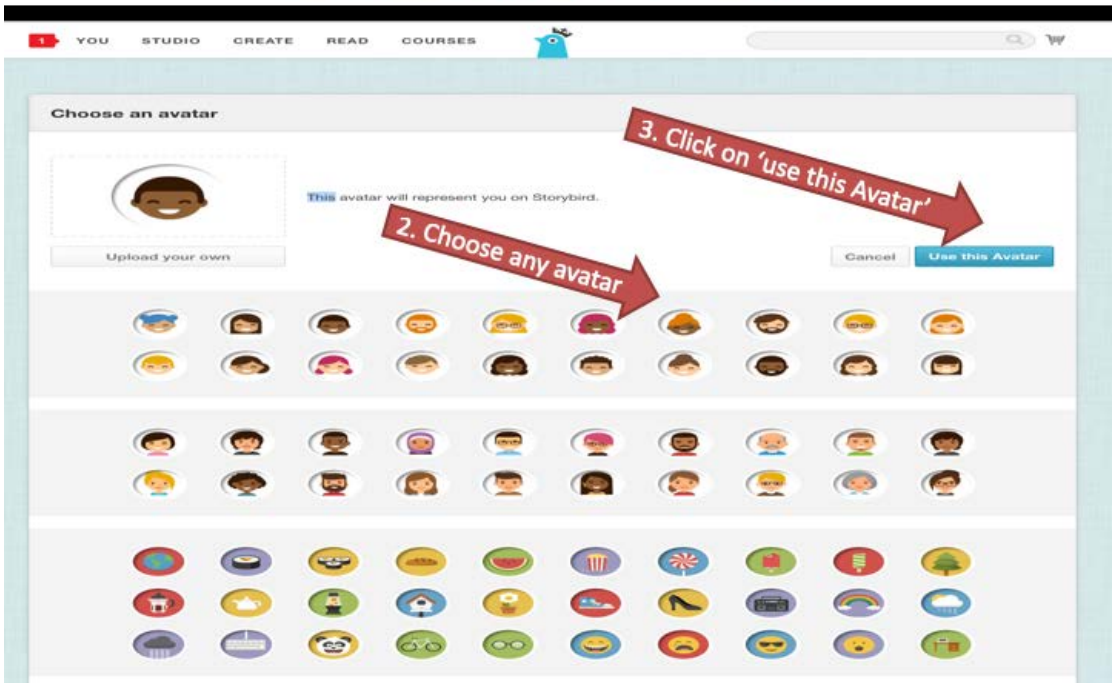
Customizing User profile



Choose your personal avatar



Choose your Avatar



Experiment 1 is Finished
Please go and assess the tool

Experiment 2

Task F

Playing a brief games and use Interactive material

Playing a brief games and use Interactive material

- **Open http://www.alefbata.com/**
- Click on ‘ هيا ؛
- Type the user name ‘mesh asiri’ and the password ‘mesh205’
- Click on ‘العاب’
- Scroll down and choose exercise no 180 and then exercise no 188

The user interface (واجهة المستخدم)

Register boy in the website

the ability to change the language setting to gender-specific language

All the user interface will change to be suitable for boy

All the user interface will change to be suitable for boy

Task O

checking the Arabic user interface

checking the Arabic user interface

- Open this website http://anasworld.net/
- Go over the icons in the website and listen
- Click on 'قرآني'
- back to the main page by using 
- Click on 'السيرة النبوية'
- Click on play button 
- Go to the next page of the story 

The tool has visual library that reflects Saudi culture holy sites in Islam

The tool uses understandable literal icons and directional images that reflect the purpose in Saudi culture

literal icons

Appendix K **The Results of Second Run for Exploratory Factor Analysis**

K.1 The Second run Factor Analysis for sustainability elements

Items		Communalities	Component 1	2	3	4
Component 1: Obtaining children' Attention (OCA)						
OCA1	The tool has visual representations, such as pictures before starting the storytelling activity	.581	.741			
OCA2	The tool has different types of examples	.480	.511			
OCA3	The tool has brainstorming and organising techniques such as storyboarding and story mapping before starting the storytelling activity	.713	.762			
OCA4	The tool has various formats of storytelling, such as long form (more text, fewer images) and short form (more images, less text)	.667	.778			
OCA7	The tool allows the use of interactive materials or multimedia	.772	.843			
OCA8	The tool involves a brief gaming activity	.600	.749			
Component 2: Establishing children's Relevance (ECR)						
ECR2	The tool gives children the choice to write a story in any way	.746		.827		
ECR4	The tool has activities suitable for the children's level	.813		.784		
ECR5	The tool has vocabularies that reflect the language of the children	.779		.841		
Component 3: Gaining Children's Confidence (GCC)						
GCC2	The tool has challenging tasks	.537			.712	
GCC3	The tool has frequent and varied activities	.582			.607	
GCC5	The tool gives children a sense of independence such as within self evaluation and easy access without guidance	.676			.650	
Component 4: Obtaining children' Satisfaction (OCS)						
OCS2	The tool gives praise for successful progress or accomplishment	.664				.802
OCS3	The tool varies the schedule of reinforcements	.770				.845
OCS4	The tool provides motivating feedback (praise) immediately following task performance	.703		.401		.625
Eigenvalue			4.995	2.176	1.592	1.321
% of Variance			33.30	14.50	10.61	8.804
Total Variance Explained		67.21%				
KMO		.648				
Barlett's Test of Sphericity		376.083				
Significant		.000				

K.2 The Second run Factor Analysis for Educational Elements

Items		Communalities	Component 1	2	3
Component 1: Teacher' role (TER)					
TER2	The tool provides teachers the opportunities to give feedback and comment on children's work	.587	.735		
TER3	The tool provides teachers opportunities to reward students' work	.510	.606		
TER5	The tool allows teachers to design storytelling activities	.748	.833		
TER6	The tool allows teachers to modify storytelling activities	.893	.873		
Component 2: Class Management System (CMS)					
CMS1	The tool has a password-protected system to log in with different levels of authorities and functions	.663		.791	
CMS3	The tool allows the creation of teams to accomplish a task	.613		.705	
CMS4	The tool allows for developing smaller learning communities	.752		.686	
CMS6	The tool provides criteria for evaluation practices	.725		.837	
Component 3: Social presence (SOP)					
SOP2	The tool allows child to safely use various communication and discussion tools with colleagues, parents, and teachers	.596		.536	.550
SOP4	The tool has social rewards, such as "like" buttons and other incentives	.635		.567	.481
SOP6	The tool helps the children to collaborate with colleagues, teachers and parents	.564		.690	
Eigenvalue			5.109	1.147	1.029
% of Variance			46.44	10.43	9.359
Total Variance Explained		66.236%			
KMO		.687			
Barlett's Test of Sphericity		271.754			
Significant		.000			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 5 iterations.

K.3 The Second run Factor Analysis for Technical Elements

Items		Communalities	Component 1	Component 2
Component 1: Usability for Arab Users (UAU)				
UAU1	The tool supports the direction of writing from right to left for text	.902	.948	
UAU2	The tool supports the direction of writing from right to left for numbers	.857	.916	
UAU3	The tool allows users to write with diacritical marks	.584	.764	
Component 2: Usability for children (UCH)				
UCH2	The tool use video-based help	.557		.742
UCH3	The user interface uses funny, colourful, encouraging and entertaining content	.603		.777
UCH4	The design of the user interface is easy and simple to use	.718		.827
UCH5	The fonts (style, colour) in the tool are easy to customise	.701		.837
UCH7	The user interface has a clear and consistent navigation	.757		.870
UCH8	The user interface uses clear understandable icons	.594		.769
Eigenvalue			4.025	2.248
% of Variance			44.72	24.97
Total Variance Explained		69.69%		
KMO		.756		
Barlett's Test of Sphericity		261.130		
Significant		.000		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 5 iterations.

Appendix L **Participants' Materials for conducting the Focus groups**

- **L.1 Participant Information Sheet**
- **L.2 Consent forms**
- **L.3 Instructions for participants during the Focus Group Discussion**
- **L.4 The Guidelines for the study**

L.1 Participant Information Sheet

Study Title: The Guidelines for Web Designers to Design Web Tool that motivate Arab Children in Writing Arabic Narrative
Researcher: Mashael Asiri **Ethics number**: 48563

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

What is the research about?
The aim of this study is develop guidelines for the web designers to design web tool that engage Arab children in writing Arabic narrative. This research is under direction of the School of Electronic and Computer Science, University of Southampton, UK.

Why have I been chosen?
I invited you to participate in this study that focus on design web tool that engage Arab children in writing Arabic narrative. Your opinion will help in evaluating the guidelines for web designer.

What will happen to me if I take part?
When you are agreed to participate, Participants were given an information sheet to inform them about the study. Participants were ensured that no particular information was collected. The responses were only available in the form of analyses and summary. The emails used for contacting the participants and consent information were kept confidential. No link would be visible between participant emails and his/her response sheet. Participants were also informed that their involvement was voluntary. They may request to pull out from the study at any time, and no further action was required. Once the participant read the information sheet, they were given a consent form to sign.
Once the consent form was signed and all participants were ready, the participants were given the guideline to be reviewed within 10 minutes. After that, the researcher acting as the moderator started the discussion. As a moderator, the researcher went through the guidelines one by one and asked for the participants' opinions on each of the guidelines. Each participant had a turn to give their opinions. The discussions were recorded and all opinions were noted. The discussion session lasted about 90 minutes.

Are there any benefits in my taking part?
This research is not designed to help you personally, but your feedback will help me gather educationalist opinions on the development efforts.

Are there any risks involved?
No.

Will my participation be confidential?
Yes. Your information will be stored and used on secure systems and will be used for this study purpose only and your responses are voluntary and will be confidential. Individual responses will not be identified. All responses will be compiled together and analysed as a group.

What happens if I change my mind?
You have the right to terminate your participation in the research, at any stage, you do not need to give any reasons, and without your legal rights being affected. Your data will be deleted directly if you decide to withdraw at any time.

What happens if something goes wrong?

In the unlikely case of concern or complaint, please contact Research Governance Manager (02380 595058, rgoinfo@soton.ac.uk).

Where can I get more information?

For further details, please contact either myself or my study supervisor, Dr Gary Wills and Proof Mike Wald

Mashael Asiri: mma2g14@ecs.soton.ac.uk
Gary Wills: gbw@ecs.soton.ac.uk
Mike Wald: mw@ecs.soton.ac.uk

L.2 CONSENT FORM (*ver.1*)

Study title: The Guidelines for Web Designers to Design Web Tool that Engage Arab Children in Writing Arabic Narrative

Researcher name : Mashael Asiri
Study reference : -
Ethics reference : **ERGO/ FPSE/** 48563

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (11042019/1 of participant information sheet) and have had the opportunity to ☐

I agree to take part in this research project and agree for my ☐

I understand my participation is voluntary and I may withdraw at ☐

Data Protection
I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing any personal data will be made anonymous.

Name of participant (print name).....

Signature of participant.....

Date.....

L.3 Instructions during the Discussion

- No right or wrong answers, only differing points of view
- We're tape recording, one person speaking at a time
- We're on a first name basis
- You don't need to agree with others, but you must listen respectfully as others share their views
- My role as moderator will be to guide the discussion
- Talk to each other

Discussion Questions

Discussion questions were constructed to examine the suitability of the content of the guideline. For the purposes of examination, the discussion went through each of the guidelines and the following questions were asked;

1- What do you think about the guidelines? Do the guidelines make logically sense?
2- How do you think the guidelines can help you to design such applications?

L.4 The Guidelines for the study

Guideline Title:	**Sustainable Elements (SE)**
Description	Sustainable elements in web-based tools are required to keep children motivated in the process of writing. The process requires different strategies before and after writing process that should apply in web-based tools. To develop motivational websites for story writing, designers should include the design elements that reflect SETr framework and SETcl instrument.
Sub guideline SE1	**Strategies for Obtaining children's Attention**
Description:	The web-based tools involve functions that could help to grab children's attention before starting writing stories. These functions should help children to maintain their motivation to do tasks.
Designers should consider the following guidelines	
SE1.1	Provide visual representations such as pictures that attract and inspire children to choose from and then create the story.
SE1.2	Present different types of examples of written stories before starting the activity
SE1.3	Include brainstorming and organising techniques such as storyboarding and story mapping
SE1.4	Add various formats of story-writing, such as comics, long form (more text, fewer images) and short form (more images, less text).
SE1.5	Provide opportunities for users to choose any topic where related materials such as pictures and keywords are presented with the chosen topic.
SE1.6	Enable the user to add interactive materials or multimedia within written stories such as combination of texts, graphics, still images, animation, video, and audio.
SE1.7	Provide a brief gaming activity or exercise that is closely related to the written stories [for example: choose appropriate word or organize a written story].
Sub guideline SE2	**Strategies for Establishing children's Relevance**
Description:	The story-writing tools involve characteristics in which the content relates to a children' interests before starting the activity of writing stories.
Designers should consider the following guidelines	
SE2.1	Try to design familiar tools for writing, erasing and moving objects
SE2.2	Give children the choice to write a story in any form and at any time without restrictions or control from anyone such as the teacher
SE2.3	Consider designing the story-writing activity to be suitable for the children's level
SE2.4	Consider using appropriate language that is suitable for children level.
Sub guideline SE3	**Strategies for gaining children's Confidence**
Description:	using strategies that help learners build up positive attitude and expectancy toward success
Designers should consider the following guidelines	
SE3.1	Create optional challenges that aim to boost children confidence.
SE3.2	Enable children to do frequent and varied story-writing activities based on

	their level
SE3.3	Provide children with a sense of independence for example by self evaluation
Sub guideline SE4	**Strategies for Obtaining children' Satisfaction**
Description:	The strategies that help learners attain satisfactory feeling after doing tasks
Designers should consider the following guidelines	
SE4.1	Adding various rewarding options for successful progress or accomplishment such as badge, trophy and points
SE4.2	Adding unexpected reinforcements such as badges, points based on the story- writing activity. [For example, if children write long story, they earn a number of coins].
SE4.3	It could be good if the tool varied the schedule of reinforcements [for example, children achieve one badge when they write three long stories]
SE4.4	Try to clearly show a clear motivating feedback (praise) immediately following task performance.

Guideline Title:	**Educational Elements (EE)**
Description	Educational elements that are related to how children socialize and get help to do tasks. Following the SETr framework and the SETcl instrument, educational elements can support learning and motivation to do task and use the tool.
Sub guideline EE1	**Teacher' Role**
Description:	Story-writing tools involve functions for teachers that could facilitate children' motivation. These functions should contribute to encouraging children to write stories.
Guideline for designers	
EE1.1	Provide teachers with opportunities to give feedback and comment on children's work
EE1.2	Provide teachers with opportunities to view all students' stories and reward students' work with for example a badge
EE1.3	Consider adding various options for teachers to design the assignment or the activity. For example let them choose a title for the assignment, describe the assignment, use a photo to inspire their students, enable the use of spellcheck while writing their story or choice of use writing with diacritical marks and specify a deadline for the assignment.
EE1.4	Provide teachers with the opportunities to modify the assignment
Sub guideline EE2	**Class management system**
Description:	Class management system has various techniques that teachers can use to keep children organized and productive during story writing.
Guideline for designers	
EE2.1	Provide a password-protected system to the class to log in with different levels of authorities and functions
EE2.2	Enable teachers to create a class.

EE 2.3	Enable teachers to group children into teams to accomplish a task.
EE 2.4	Enable teachers to add children to the class by their email or by parent' email
EE 2.5	Provide teachers with opportunities for evaluation practices

Sub guideline EE3	**Social presence**
Description:	Social presence involves features to deliver a sense of connection with others (peers and parent). This kind of interaction can motivate children to use story-writing tools.
Guideline for designers	
EE 3.1	Consider designing various communication and discussion tools to enable children to communicate with colleagues, parents, and teachers
EE 3.2	Offer social rewards, such as "like" buttons and other incentives
EE 3.3	Provide a collaboration function with colleagues, teachers and parents

Guideline Title:	**Technical Elements (TE)**
Description	Technical elements refer to the web usability of the web user interface which must have a user-friendly design. Following the SETr framework and the SETcl instrument, technical elements can support children motivation to design usable story writing tool.
Sub guideline TE1	**Usability for Arab users**
Description:	If the Story-writing tool is designed for Arab users, the designer should consider designing user interface in Arabic language that support writing activities and social interaction. These functions should contribute in encouraging children to write stories and use the tool.
Guideline for designers	
TE1.1	Consider designing user interface that supports the direction of writing from right to left for the written text.
TE1.2	Consider designing user interface that supports the direction of writing from right to left for numbers
TE1.3	Try to design Arabic auto correction that supports writing with diacritical marks
TE1.4	Enable user to modify an appropriate vocalization of Arabic text.
Sub guideline TE2	**Usability for children**
Description:	The design of user interface has to meet the children's needs. The tool should be easy to use by children to motivate them.
Guideline for designers	
TE2.1	Provide help functions such as video-based help or hints to keep children feeling supported when users seem lost
TE2.2	Try to design the website with funny, colourful, encouraging and entertaining content

TE2.3	Try to design websites that are easy and simple to use
TE2.4	Offer a customization option of web content such as fonts (size, style, colour)
TE2.5	Try to design a clear and consistent navigation
TE2.6	Try to design clear and understandable icons

Appendix M **Focus Group Comments and Suggestions**

Sub Guidelines	Comments to improve
Sub guideline SE1 **Strategies for Obtaining children's Attention**	**Focus group1** **SE1.2**- give example of different types of examples of written stories **SE1.3**- cross reference with the figure in the given examples to clarify the storyboarding and story mapping techniques **SE1.7**- suggestion to add the text with use third party: *Provide a brief gaming activity or exercise by using third party that is closely related to the written stories [for example: choose appropriate word or organize a written story].* Re-order the guidelines to be logical for the developer
	Focus group2 **SE1.2 modify-** Present simple different examples of written stories before starting the activity SE1.3 **modify** *the system should include brainstorming and organising techniques such as storyboarding and story mapping within the example and before writing activity.* SE1.3 "interesting and entertaining " SE1.5 **modify** Give the children the options to choose from any pre-defined topic or pre-designed stories. **SE1.6 modify.** Delete **"**interactive materials" and clarify from where can the system add the multimedia from the web or upload from the device. *Enable the user to add multimedia from the web library within written stories such as combination of texts, graphics, still images, animation, video, and audio*. **SE1.7-modify.** *Provide simple exercise before story writing [for example: choose appropriate word or organize a written story].*
	Focus group 3 SE1.1 the pictures should be appropriate for children age and gender. SE1.2 **Modify**. Sometimes this could be minimising the creativity for the kids because they could copy the example. *Present different guided examples of written stories before starting the activity.* SE1.3 add example brainstorming and organising techniques
Sub guideline SE2 **Strategies for Establishing children's Relevance**	***Focus group 1*** **SE2.1**- Modify- better to add ready to use toolbar without designing toolbar from scratch. *Try to add ready familiar toolbar for writing, erasing and moving objects.* **SE2.2**-modify- *Give children the open access to write a story in any form and at any time without restrictions or control from anyone such as the teacher.* **SE2.3-** gives examples how the developer can determine the suitable story-writing activity such as by the children's profile or applying fancy keyboard.

	Focus group 2 **SE2.1** modify –(don't give the choice for the developer) write *include familiar toolbar for writing, erasing and moving objects.* **SE2.2** modify- *children can access the system any time and any where* SE2.3 modify- *the tool and the story activities must be designed to be suitable for the children age*. **SE2.4 modify-** *the tool must* using appropriate language that is suitable for children age. **In general** In description change the children' interest to children' relevance.
	Focus group 3 SE2.1 modify. "simple and familiar tools" SE2.3 modify *Consider designing the story-writing activity* ***and materials*** *to be suitable for the children's level* **In general** Add new guidelines. *Based on children' profile (gender, age, preferences) related pictures or story-writing material are presented to write stories.*
Sub guideline SE3 Strategies for gaining children's Confidence	**Focus group 1** **SE3.3** - change *self-evaluation* to *auto evaluation for text*. *provide children with a sense of independence for example by auto evaluation.*
	Focus group 2 SE3.1 **modify**. *Add optional challenges for creating stories that aim to boost children confidence* **SE3.2** change 'frequent and varied story-writing activities'in the text into – provide children with customized story-writing activities based on children level and progress. (For example some application give the user the choice to do the activity again or go to the higher level)
	Focus group 3 SE3.3 **Add one point as sub guidelines.** *Try to avoid peer evaluation*
Sub guideline SE4 Strategies for Obtaining children' Satisfaction	**Focus group 1** Add SE4.2 and SE4.3 as a sub guidelines of SE4.1
	Focus group 2 **SE4.2 modify-**Adding unexpected reinforcements for creative story. [For example, if children write creative story, they earn a number of coins]. SE4.3 change *it could be good if the tool* into *make the tool varied the schedule of reinforcement.*
	Focus group 3 Add SE4.2 and SE4.3 as a sub guidelines of SE4.1 SE4.3 re-write it. *it could be good if the tool* into *make the tool varied the schedule of reinforcement*
Sub guideline EE2 Class management system	**Focus group2** **EE** 2.5 Linked this point to EE1.1, 1.2, 1.3, 1.4

Sub guideline EE3 **Social presence**	**Focus Group 1** **EE 3.3** modify-*Provide a collaboration function with colleagues, teachers and parents to help children in complete the story*
	Focus Group 2 **EE 3.3 clarify why collaboration function:** *Provide a collaboration function to invite colleagues, teachers and parents in writing the story*
	Focus group 3 **EE** 3.1 change "discussion tools" into "discussion board". **EE 3.3 clarify collaboration function by example:** *Provide a collaboration function to invite colleagues, teachers and parents in writing the story*
Sub guideline TE1 **Usability for Arab users**	**Focus group 1** Merge between TE1.1 and TE1.2 from right to left for the written text and numbers **TE1.3** modify- *try to add an optional Arabic auto correction that supports writing with diacritical marks* **TE1.4**- Modify and adding example- *Enable user to easy modify diacritical marks of Arabic text by using for example Arabic virtual keyboard*
	Focus group2 Merge between TE1.1 and TE1.2 from right to left for the written text with and without diacritical marks numbers TE1.3 modify. *Try to add Auto tools that support writing the story. For example auto correction tool to correct the grammar and vocabulary in Arabic text or auto tools that add missing diacritics to Arabic text* TE1.4 delete it TE1.3 include it
	Focus group 3 TE1.3 divide this point into two points one for Arabic auto correction and one for added diacritical marks TE1.4 added it as sub guidelines from TE1.3. Suggestion for future work enable system to read the children' story with vocalization of Arabic text to help children add the diacritical marks.
Sub guideline TE2 **Usability for children**	**Focus group2** **TE2**.5 Make the navigation simple and consistent. Suggestion to add accessibility tools. Change everything to be must not try to
General	**Change the guidelines to be must and should** **Change the guideline title**

Glossary of Terms

Web-based story-writing tools: Tools that focused on story writing in web based systems.

Motivation: A desire that stimulate and sustain 9-12 years children to participate in web-based story-writing tools.

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