

A Gamified Kenyan K-12 Learning System

B.K Chemwotie¹ and Z. Fengnian¹

¹ Beijing Institute of Technology, Beijing, China

Abstract— Traditional teaching methods rely on written exercises, books, oral lectures and blackboards as the primary vehicles to spread knowledge. Nevertheless, technological process brought new opportunities to teach and educate, such as using video games that spiced up curiosity and fired reviews amongst many educators and researchers. Research shows that video games have a great potential to improve the learning experience and learning outcomes. These facts among others led to this research.

Index Terms— Education, E-school, Gamification

I. INTRODUCTION

Gamification that can be defined as the use of game elements in a non-game context has drawn a lot of attention in the recent past from various industries and academia. Video games are the dominant entertainment form of our time since they have proven to be powerful tools that help most people in behavior motivation. Effective games leverage both psychology and technology, in ways that can be implemented outside the immersive environments of games themselves. Studies have shown that gamification as a business practice has exploded over the past few years. Organizations are implementing it in areas such as marketing, human resources, productivity enhancement, education, sustainability, training, health and wellness, innovation, and customer engagement.

Gamification has been defined in various areas, but the most acceptable one is the use of game design elements in non-game contexts to motivate and increase user activity and retention [1]. The term gamification came into existence in 2008 [3], although it did not receive much of attention. It was then widespread in 2010 during the 2010 DICE Conference by Jesse Shell and Carnegie Mellon during their presentation of 'the future of games'. They pointed out that games are and will remain being part of our daily lives [2].

Gamification, as indicated earlier, is the use of game-play mechanics for non-game applications [5]. Any task, process, application or context can be theoretically gamified. The primary goal of gamification is to raise the engagement of users in various systems by using game-like elements like personalized fast feedback and scoreboards [6]. This, therefore, makes people have more ownership and purpose when engaging with tasks [7].

Gamification has been used in many different contexts mostly marketing and business. There are various applications that demonstrate its use and effectiveness in an academic field. By the use of game elements in work activities, designers wish to raise motivation [8]. In order to do so, there is a need for paying attention when integrating tasks and exercises in the game design [9]. Everyday activities especially those that are done for longer periods of time are typically not appealing but when these activities are combined with simple games there can be a more efficient way of motivating people [4]. Gamification has found its way into various uses such as education.

A. Gamification in Education

There are a few academic researches that have focused on implementation of education gamification systems. Some of the most successful ones include Kelle, Specht and Klemke's

research [9]. They isolated two game mechanics to study, scores and time-limits, and applied them to already established life support training content in four different control groups. One with no game mechanics, one with scores, one with time-limits, and finally, one with both. The biggest knowledge gain measured was in the group where both mechanics applied. Surprisingly, groups that had only one game mechanic used showed no significant learning gains while the group with no game mechanics performed better than the group with only one [9]. These results lend credit to those who criticize gamification as focused only on pointification.

The results have implications for organizations who are implementing gamified systems. However, the game mechanics which can improve results on their own, and which require a combination effect to be effective, is not clear from the study, as it is only focused on the two game mechanics highlighted above. Further studies with a similar structure could be conducted to measure the effects of different game mechanics together.

Gamification has also been strongly utilized in education. A study carried out at the University of Ulster in the United Kingdom applied gamification mechanics to a mandatory first-year course for computing students. The mechanics included a points based system, immediate feedback, and optional challenges. The pass rate rose from 82% to 95% of the class, an increase of 13 percentage points. The study was repeated in another course in the next semester, and the failure rate dropped from 25% to less than 10%. [10]. The results indicate that game-enhanced learning improves student motivation and knowledge gain. Gamification of the modules also smoothed the distribution of the marks, removing the long tail of weak performing students, as shown in Figure 4. This suggests gamification of education is of benefit to weaker students, as it improves their motivation, and has less of an effect on stronger students [10].

Educational Gamification should not be confused with serious games, simulations or game-based learning. These focus on designing games (and experiences that are game-like) that impart an educational gain and includes software like simulators. This is the opposite of scholarly gamification; that attempts to include game-like ideas to a learning process.

B. Examples of Gamification in Education

DuoLingo: This is a massive online collaboration that combines a free language-educational website with a paid crowd sourced text translation platform. The service is sketched in a way that students can learn a given language

online while helping to translate websites and documents. Beginners begin with basic, simple sentences from the web while advanced users receive more complex sentences. As one progresses, so does the complexity of the sentences they are asked to translate [37].

Ribbon Hero: This is an add-in game, accessible as a free Microsoft download, to aid in education of users of Office 2010 and 2007 on how to use the tools that are available in the new ribbon interface. Once installed, the game can easily be started from any of the key Office programs, such as PowerPoint, Excel, and Word. Once in the game, the user is presented with challenges that can yield points if completed [38].

ClassDojo: ClassDojo is a classroom supervision tool to help teachers improve behavior in their classrooms easily and quickly. It promotes specific student behaviors and helps engagement by issuing awards and recording real-time feedback. Each student gets an avatar that can be visibly displayed in ClassDojo. For affirmative action, it is easy for the teacher to begin quick feedback to the learner, awarding feedback points by a simple click on his/her mobile device or computer. This instantly reinforces good behavior and engages other students. There are excellent education gamification techniques at play here [39].

GoalBook: This is an online platform that helps teachers, parents and learners collaboratively monitor progress. Blending qualities of a social system and Individualized Education Program (IEP) tracking software, the application makes it simple for learners and teachers to set goals and for all involved parties to watch everything unfold. With GoalBook, a teacher can quickly access the profiles of all her students and review their objectives. The teacher can then keep track of the progress of each student as they complete the goals for each objective. When intent is met, the teacher can promptly update the student's profile and then share it with his team. From his/her web page, she can quickly update and honor the accomplishments for any of his/her students, as well as see what they are sharing [40].

Code Academy: This is an online interactive platform that extends free coding classes in six programming languages like Ruby, JavaScript, jQuery, PHP, and Python, as well as markup languages including CSS and HTML. As of January 2014, the site had over 24 million users who had completed over 100 million exercises. The site has received confident reviews from many websites and blogs, including TechCrunch and the New York Times [41].

Schooooooos.com: This is an online community of schools - the schoooooos. Every school is a representation of an actual school, in the web. As it is in real life, at schoooooos.com, each institution can only access parents, teachers, and students, authorized by the school, therefore creating a close and safe space. Using similar school organization and class concepts, schoooooos.com behaves in a natural ingenuousness manner for all. In regards to this, schoooooos.com has made it easy to communicate, collaborate, play and work with everyone. schoooooos.com is available for all educative institutions, public or private, for kids ranging from grade 4 up to 12 [42].

II. RELATED LITERATURE

A. Introduction

In the recent past, various definitions of the term gamification have emerged. Sebastian Deterding proposed an academic definition: Gamification is the use of game design elements in non-game contexts [10]. Gamification is made up of three main building blocks: goal focused activity, reward mechanisms, and progress tracking [11].

B. Gamification building blocks

- Goal-focused activity - Activities in games are always goal-oriented with a clearly defined set of 'win' conditions and a number of obstacles to overcome in order to complete the activity [12].
- Reward mechanisms - Games use various rewarding mechanisms, but there are three main ones that are widely used. These are achievements, prizes, and leaderboards.
- Progress tracking - As with any activity, it's necessary to track the progress to know the remaining conditions in order to attain the desired goals.

From the brief explanations above, it is clear that there is a correlation between learning activities and the design of games. As mentioned in the definition, gamification involves game elements being applied in a non-game context. Some elements, as identified by Reaves and Reads [13] include: Self representation with avatars, narrative context, competition under rules that are enforced and explicit, three-dimensional environments, reputations (ranks and levels), feedback, marketplaces and economies, easily configured parallel communication systems, teams and time pressure. The primary intention is to insert the feeling of a game where there is a rule based formal situation with quantifiable and variable outcomes, where various outcomes are assigned different respective values. The user puts effort to influence the result, the user feels attached to the outcome, and the consequences of the user's actions are optional and negotiable. There are many successful gamification applications such as Nissan's Zero Emission from Nissan used in its ecological model Nissan Leaf. Nike ID, an e-commerce gamified application, allows users to design their shoes; the most popular types gather points. Kobo Reading Life is a system that tries to gamify reading. Various application of gamification can be seen in the industry of health and wellness: Keas, FitBit, Lose It. Motivation and learning also give examples like Stick.com, Mind Snacks, and English Attack. Gamification desires to combine extrinsic motivation with intrinsic ones in order to increase motivation and engagement [14]. Intrinsic motivations originate from within, the user decides to either make an action or not. Examples of intrinsic motivations include altruism, competition, and cooperation, love, sense of belonging or aggression. Extrinsic motivations, on the other hand, transpire when something or someone determines the user to make an action. For instance: elements of gamification (classifications, levels, points, badges, awards, missions).

C. Personality Types

In this research we used Bartle Test of Gamer Psychology types [14] to classify Player Personality Types into four types: Achievers, Explorers, Socializers and Killers. Each of these types has been briefly described below:

- Achievers are driven by in-game goals. Usually, they are involved in some form of point-gathering in form of points, levels or money.

- Explorers are driven to find out as much as they can about the virtual construct including understanding the game mechanics and mapping its geography.
- Socializers uses the virtual construct to converse and role-play with their fellow gamers.
- Killers make use of the virtual construct to cause distress to other players, and gain satisfaction from inflicting anxiety and pain on others.

D. Why Gamification

When observing players playing games – especially video games – it is apparent that the emotional and motivational

involvement during playing can be immense [34]. The fundamental idea of gamification is to apply this motivational potential of games for other determinations not solely related to entertaining missions of the game itself. This idea was initially coming from marketing spread to different contexts involving business [35] and education [36]. Gamification environments are currently applied with aims as diverse as fostering safe driving behavior, motivating for physical workout, influencing environmental behavior, or enhancing learning in schools and training. Different motivational mechanisms can be addressed by various game elements as illustrated in the table below: Table 2.1 Game elements and related motivational mechanism

Game Elements	Motivational Mechanism
Points	<ul style="list-style-type: none"> • Points function as immediate positive reinforcements. • Points can be seen as mostly virtual rewards, provided for executed actions.
Badges	<ul style="list-style-type: none"> • Badges fulfill the players' need for success and thereby address people with an active power motive. • Badges work as virtual status symbols and thereby address people with a strong power motive. • Badges function as a form of group identification by communicating shared experiences and activities [26] and thereby address people with a strong affiliation motive. • Badges also have a goal setting function. • Badges can foster the players' feeling of competence
Leaderboards	<ul style="list-style-type: none"> • Individual leaderboards foster competition and address achievement and power motives. • For players at the top of leaderboards, feelings of competence can arise. • Leaderboards, which provide a team score, can foster the team members feelings of social relatedness, as they emphasize collaboration and community activities provided by shared goals and opportunities for shared experiences
Progress bars and performance graphs	<ul style="list-style-type: none"> • Both progress bars and performance graphs provide feedback. • Progress bars provide clear goals. • Performance graphs compare players' performance to previous performances and thereby focus on improvement and foster a mastery orientation regarding goals.
Quests	<ul style="list-style-type: none"> • Quests provide clear goals. • Quests highlight resulting consequences of a goal. • Quests emphasize importance of a player's action in a given situation.
Meaningful stories	<ul style="list-style-type: none"> • Stories can meet the players' interest and spark interest for the situational context. • By offering a variety of stories and meaningful choices within the stories, feelings of autonomy can arise. • Inspiring stories can also foster and increase positive feelings
Avatars and profile development	<ul style="list-style-type: none"> • Choices regarding the offered avatars, which are leading to different forms of gameplay, can foster feelings of autonomy. • Positive feelings and emotional bonds can arise by providing avatars and by taking a developmental progress with the avatar.

III. GAMIFICATION AND EDUCATION

A. Introduction

In many ways, education slightly resembles a game [21]. A game can be thought of as an extremely structured system that is designed to specific challenges, rules and goals. Successful games are fun – they stimulate players to engage in the chore at hand, from collecting coins and saving princesses to storming battlefields in multiplayer combat plots (the Modern Warfare series appears to mind). At a profound level, games activate a very primal response; they tap into the learning and behavior processes of the brain. People become so wholly engaged in gameplay precisely since they are challenged; they must earn and master new skills if they wish to progress to higher levels of complexity. If a chore is too challenging it will lead to

anxiety; if it is too easy it will result in boredom (the state of flow) [22].

B. Gamification applied in learning

Gee and Prensky first pointed out the high potential of using gamification in learning [16]. As described by Gee, there is a tremendous impact of game play on cognitive development. There are also 36 different learning principles that can be found in games. Besides the arising movement that defends the extension and application of the gamification elements in solving real-world problems and other areas that have no relation to games or entertainment fields, there has been increase in popularity of video games. Some examples to this can be seen in situations where gamification is used to prevent the world hunger or to advance the quality of life of people with incurable diseases as pointed out by McGonigal [17]. The

movement, mentioned above, also known as serious game, is concerned with video games that have a learning objective [18]. The use of games in schools to enhance and support learning has become widespread. This is known as Game-Based Learning.

Winn mentioned that the 'serious game' movement is towards the development and cultivation of interactive learning environments [19]. The introduction of learning environments has been in part propelled by the epistemological turn towards constructivism and in part fueled by the influence and integration of technology and learning [19, 20]. The theoretical hypothesis underlying interactive learning environments is that students construct understanding by interacting with information, materials, and tools as well as by collaborating with other students. The development of new instruments and technology is always challenging the area of instructional design to find models and techniques for developing engaging interactive learning environments.

One source of inspiration for potential models, strategies, and techniques is the design of popular video and computer games. The aim of video and computer games is to entertain, nevertheless, in order to engage players, game developers have become well versed in creating exercises and environments that promote intrinsic motivation. The identification and appropriation of many of these techniques is a great relevance for the creation of interactive learning environments

C. Learning Theories

According to Van Eck [21], there are five broad categories of learning theories: behaviorism, cognitivism, humanism and constructivist approaches to teaching and learning.

Behaviorism

Behaviorism is essentially concerned with discernible and measurable features of human behavior. While defining behavior, behaviorist learning theories highlight variations in behavior that emerge from stimulus-response connections made by the student. Behavior is influenced by stimuli. A learner selects a response instead of another due to preceding psychological drives and conditioning existing at the time of the action [23, 24]

Constructivism

This approach describes the way in which a learner builds knowledge without the help or supply from the teacher [24]. There are two subcategories of this approach that have been identified; constructionism, which involves learners gaining knowledge based on construction of products that are attached to them [25], and community supported constructionist (Cognitive apprenticeship), which students gain knowledge

when they are acculturated into authentic practices through activity and social interaction [26].

Cognitivism

This approach considers learning not to be simply stimulation and reinforcement, but to involve thinking [28]. Cognitivism is based on two main assumptions: that the memory system is an organized, active processor of information and that prior knowledge plays a significant role in learning [27]. This approach is made up of four principles:

- *Attribution theory* – This is a case in which learners attempt to explain the world and to ascertain the cause of an event or behavior [29].
- *Elaboration theory* - In this principle, content to be learned should be organized from simple to complex [30].
- *Cognitive development* - This theory describes cognitive development as four distinct stages in children: formal operational, preoperational, sensorimotor and concrete operational
- *A condition of learning* – This theory identifies five different levels or categories of learning, each with a different type of instruction. These are intellectual skills, motor skills, verbal information, cognitive strategies and attitudes.

Humanism Learning Theory

Humanism theory focuses on potential, dignity and human freedom. According to this theory, learning should be student-centered and personalized, and the educator should act as a facilitator. There are five instructional principles in these theories: learning by doing, experiential, guided experiential, case-method teaching, and a combination of experiential and inquiry-based learning [32].

D. Implementing learning theories in gamification

Subject to the above mentioned theories, gameplay, game rules and game narratives are used to explain various gamification aspects [33].

Gameplay - Gameplay involves interaction with a game through its rules, the connection between the player and the game, challenges, solutions, the plot and the player's emotional connection with the conspiracy.

Game rules – these are the guidelines on how a game is played. It also involves how points or other elements can be accumulated by the players.

Game narrative – This is a description that includes setting, action and character. It is a story that is created in a constructive manner to describe fictional or non-fictional events.

Learning Theory	Game Play	Game Rules	Game Narrative
Behaviorism	Learners need to know their goals and achieve them through stimuli-reaction process.	Learners need to know the things that need to be done and the ones that need not to be done.	Learners are treated and expected to be information receivers. They are expected to absorb all the information given.
Constructivism	Learning process is not limited to an individual. Interaction with other learners is viewed as learning process.	Interaction between players and games is stressed.	Its constructed to enable the learners perceives a game world where they interact with each other.
Cognitivism	The context-dependent nature of knowledge where learning is promoted through scaffolding for task	Learners are left to figure out on their own the biggest portion of the rules.	This is set to be sophisticated and to involve emotional conflicts between the

	completion is emphasized.		learners.
Humanism	Learner centered approach is stressed	Learners should engage in direct experience and focus on learning reflection	Its construction is to depict the intentionality and humanity in actions performed by the learners.

E. Benefits and Challenges of Gamification in Education

The strengths of gamification and schools can be complementary, but they are not necessarily so. There are significant ways in which gamification and schools could each make the other worse. Bringing education and game elements together could turn out like peanut butter meeting chocolate: two great flavors working together, leading to effects that are important especially for developing 21st century skills. Gamification can motivate students to engage in the classroom, give teachers better tools to guide and reward students, and get students to bring their full selves to the pursuit of learning. It can show them the ways that education can be a joyful experience, and the blurring of boundaries between informal and formal learning can inspire students to learn in life-wide, lifelong, and life deep ways.

The challenges, however, are also significant and need to be considered. Gamification might absorb teacher resources, or teach students that they should learn only when provided with external rewards. On the other hand, playfulness requires freedom - the freedom to experiment, to fail, to explore multiple identities, to control one's investment and experience. By making play mandatory, gamification might create rule-based experiences that feel just like school.

IV. CONCLUSION

This paper has sought to give an understanding of the accepted definition of gamification. It has also provided the various explanations on what gamification is all about, why we use it and the various available game elements and their motivations. It has helped us to understand the different learning theories and how they can be used to implement gamification in education. The advantages and challenges of implementing gamification in education have also been discussed. As we have seen the various gaps that are available in the studied papers, future projects should at least work towards solving or filling those shortcomings. These include exploiting intrinsic motivation that is opposed to mainly used exploitation of extrinsic motivation. As it is seen in most games, players (users of the system in this case termed as players) are projected to be challenged by the tasks available in the system. They will be required to progress from the novice position at the start of the system use to the master stage when they will be experts in the use of various modules of the system. In this case, the players will need to be aware of their 'current' position at every stage of the activity, just like in a game. This will help improve the learners in knowing what he/she has learned and what is expected of him/her to still learn so as to achieve a particular goal. These concepts have not been fully trialed, and data is limited; thus, there is no empirical validation of these assertions other than anecdotal evidence and experience. The framework, as described, has been implemented and used to explore the impact on the learning process and assessment. The implemented gamification elements define an extension to the current understanding of the scope of gamification; i.e., in the context of virtual environments where badges and leaderboards fail to exploit the full potential of the virtually. Gamification is not a panacea. If we are to enhance the odds of gamification providing regard to schools, we must carefully create gamification projects that

look to the real challenges of schools that focus on the areas where gamification can provide the maximum value, which are grounded in existing research, and that address the potential perils of gamification for both games and schools. In tandem with the creation of gamification projects, we must develop meaningful assessments of whether they are achieving their aims.

ACKNOWLEDGMENT

The preferred spelling of the word "acknowledgment" in America is without an "e" after the "g." Try to avoid the stilted expression, "One of us (R.B.G.) thanks ..." Instead, try "R.B.G. thanks ..." Put sponsor acknowledgments in the unnumbered footnote on the first page.

REFERENCES

- [1] Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: defining "gamification". doi:10.1145/2181037.2181040
- [2] J. Schell. Design outside the box. DICE summit, 2010.
- [3] Personal communication, R. Paharia, March 17, 2011.
- [4] Chrons, O. and Sundell, S. (Microtask) (2011) Digitalkoot: Making Old Archives Accessible Using Crowdsourcing, workshop at HCOMP 2011, August 8, San Francisco, California
- [5] Deterding, S., Sicart, M., Nacke, L., O'Hara, K., and Dixon, D. (2011) Gamification. Using game-design elements in non-gaming contexts. In Proceedings of CHI Extended Abstracts, 2425-2428
- [6] Flatla, D., Gutwin, C., Nacke, L., Bateman, S., Mandryk, R. (2011) Calibration Games: Making Calibration Tasks Enjoyable by Adding Motivating Game Elements UIST 2011, Santa Barbara, California
- [7] Pavlus, J. (2010) The Game of Life. Scientific American, 303, 43-44
- [8] Shneiderman, B. (2004) Designing for Fun: How Can We Design User Interfaces to Be More Fun? Interactions, 11(5), 48-50
- [9] Von Ahn, L. Dabbish, L. (2008) Designing Games With a Purpose. Comm. ACM, 58-67.
- [10] Dickey, M. D. (2005). Engaging by design: how engagement strategies in popular computer and video games can inform instructional design. Education Training Research and Development, 53 (2), 67-83.
- [11] Smith-Robbins, S. (2011). "This Game Sucks": How to Improve the Gamification of Education. Educause Review, 46 (1), 58-59.
- [12] Reeves, B. and Read, J.L. (2009) Total Engagement: Using Games and Virtual Worlds to Change the Way People Work and Businesses Compete. Harvard Business School Press, Boston, MA.
- [13] Viola, F. (2011) Gamification I videogiochi nella vita quotidiana, published by Arduino Viola
- [14] R. Bartle (1996). Hearts, clubs, diamonds, spades: Players who suit muds. Journal of MUD research, 1(1):19
- [15] Gee, J. P. (2003). What video games have to teach US about learning and literacy? Palgrave Macmillan.
- [16] McGonigal, J. (2011). Reality is broken: Why games make US better and how they can change the world. Penguin Books.
- [17] Ulicsak, M., & Wright, M. (2010). Games in education: Serious games, FutureLab.
- [18] Winn, W. (2002). Current trends in educational technology research: The study of learning environments. Educational Psychology Review, 14(3), 331-351.
- [19] Hannafin, M. J., Land, S., & Oliver, K. (1999). Open learning environments: Foundations, methods, and models. In C. M. Reigeluth (Ed.), Instructional-design theories and models: A new paradigm of instructional theory. vol. II (pp. 115-140). Hillsdale, NJ: Lawrence Erlbaum Associates.
- [20] Lee, J. J., & Hammer, J. (2011). Gamification in education: What, how, why bother? Academic Exchange Quarterly, 15(2).

- [21] Csikszentmihalyi, M. (1990). Flow: The psychology of optimal experience. New York: Harper Collins.
- [22] Joyce, B., Weil, M., & Showers, B. (1992). Models of teaching (4th ed.). Boston: Allyn and Bacon.
- [23] Ertmer, P. A. and Newby, T. J. (1993), Behaviorism, Cognitivism, Constructivism: Comparing Critical Features from an Instructional Design Perspective. Perf. Improvement Qrtly, 6: 50â–72. doi: 10.1111/j.1937-8327.1993.tb00605.x
- [24] Bruckman, A. (1998). Community support for constructionist learning. Computer Supported Cooperative Work: The Journal of Collaborative Computing, 7, 47–86.
- [25] Kafai, Y. B. (2001). The educational potential of electronic games: from games-to-teach to games-to-learn.
- [26] Brown J.S., Collins A. & Duguid P. (1989) Situated cognition and the culture of learning. Educational Researcher 18, 32–42.
- [27] Merriam S.B. & Caffarella R.S. (1999) Learning in Adulthood: A Comprehensive Guide, 2nd edition. Jossey-Bass Publishers, San Francisco, CA.
- [28] Moore P. & Fitz C. (1993) Gestalt theory and instructional design. Journal of Technical Writing and Communication 23, 137–157.
- [29] Weiner B. (1974) Achievement Motivation and Attribution Theory. General Learning Press, Morristown, NJ.
- [30] Piaget J. (1969) The Child's Conception of Time. Translated from the French by Pomerans, A.J., Routledge & Kegan Paul, London.
- [31] Learning Theories Knowledgebase (2008) Index of learning theories and models. Available at: <http://www.learningtheories.com> (last accessed 23 September 2014).
- [32] Dewey, J. (1938). Experience and education. New York: Simon and Schuster.
- [33] Ang C.S., Avni E. & Zaphiris P. (2008) Linking pedagogical theory of computer games to their usability. International Journal on E-Learning 7, 533–558.
- [34] Hense, J., Mandl, H. (2012): Learning in or with games?: Quality criteria for digital learning games from the perspectives of learning, emotion, and motivation theory, In: D.G. Sampson, J. M. Spector, D. Ifenthaler & P. Isaias (eds.), Proceedings of the IADIS International Conference on Cognition and Exploratory Learning in the Digital Age, pp. 19-26, IADIS, Madrid
- [35] Werbach, K., Hunter, D. (2012): For the Win: How Game Thinking Can Revolutionize Your Business., Wharton Digital Press, Philadelphia
- [36] Kapp, K. M. (2012): The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education, Pfeiffer, San Francisco
- [37] DuoLingo. (n.d.). Duolingo | Learn Spanish, French, German, Portuguese, Italian and English for free. Retrieved from <https://www.duolingo.com/>
- [38] Microsoft. (n.d.). Ribbon Hero 2. Retrieved from <http://www.ribbonhero.com/>
- [39] ClassTwist, Inc. (n.d.). ClassDojo. Retrieved from <https://www.classdojo.com/>
- [40] Enome, Inc. (n.d.). Goalbook | Success For Every Student. Retrieved from <https://goalbookapp.com/>
- [41] Codecademy. (n.d.). Learn to code | Codecademy. Retrieved from <http://www.codecademy.com/>
- [42] Tecla Colorado Lda. (n.d.). New Technologies in Education | schoooooools. Retrieved from <http://schoooooools.com/>

AUTHORS

B. K. Chemwotie is currently pursuing his PhD program at Jomo Kenyatta University in Kenya. He is also practicing as a part-time tutorial fellow in the same institution. (E-mail: mwotie@hotmail.com).

Z. Fengnian., is a lecturer at Beijing Institute of Technology.

Manuscript received 09 October 2005. (Write the date on which you submitted your paper for review.) This work was supported in part by the U.S. Department of Commerce under Grant BS123456 (sponsor and financial support acknowledgment goes here).

Published as submitted by the author(s).