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Design and Formative Evaluation of Gitumbi's REVISION FUN GAME

William Gitumbi Kinyanjui

A Thesis

in

The Department

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ABSTRACT

Design and Formative Evaluation of Gitumbi,'s REVISION FUN GAME

William Gitumbi Kinyanjui

A learning game called Gitumbi's REVISION FUN GAME was designed. A set of quizzes called REVISION FUN QUIZZES based on the content of the Geography, history and civics syllabus of Kenya's 8-4-4 system of education were also constructed to be used with the game. The complete instructional game package was formatively evaluated using subject matter experts, one-to-one and small groups. It was also tested in the field using two intact groups consisting of 41 standard six pupils in each group. The pupils were pre- and posttested and were also given an attitude questionnaire to complete. The data obtained were analyzed and tested for significance. The results revealed that there was significant improvement in recall and recognition of verbal knowledge after playing the game. Analysis of attitude questionnaire results indicated that learners also enjoyed using the Gitumbi's REVISION FUN GAME in the classroom. Information obtained during the formative evaluation was used to improve the instructional value of the game.

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DEDICATION

To Gatere, Wanjiru, Gituru, Gathoni, Wambui, Mumbi, Muthoni, Njogu, and Kinyanjui - all who might find some inspiration in this.

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CHAPTER ONE

Introduction

Context of the Problem

The spirit with which education was conceptualized at the early stages of nationhood in Africa in general, and more so in Kenya, was prophetically resounded by Cowan et al (1965 p. v):

> Education has become a major, if not the major, concern of the new independent states of Africa. At almost every point in the modernization process, education is the critical factor, for without it Africa's peoples would be unable to enter the modern technological world. Each phase of economic planning demands not only capital, but skilled manpower, which can only be drawn from the reservoir of the educated population. For millions of Africans, education is the key that will open the door to a better life and the higher living standards they were promised as the reward of the struggle for the national liberation. No government in Africa could dare, even if it were so inclined , to deny the popular demand for the expansion of (the) educational system(s).

A quarter of a century later, educational problems continue to provide African leaders with some of the most amorphous

challenges in independent Africa. It is against this background that the events taking place in Kenya's education system today must be examined.

In January 1985, the Kenya government decided to change the education system to what is currently referred to as the 8-4-4 system. This was in response to the constraints which were earlier candidly delineated by Cowan (1965). According to the former Director of Education (Kenya Institute of Education, 1986), the 8-4-4 System of education has two important attributes: the first is

> "the change from a 7.4.2.3 structure to the 8-4-4 system. The second feature is the introduction of fundamental changes in the curriculum content and in the methods of teaching, learning and assessing pupils".

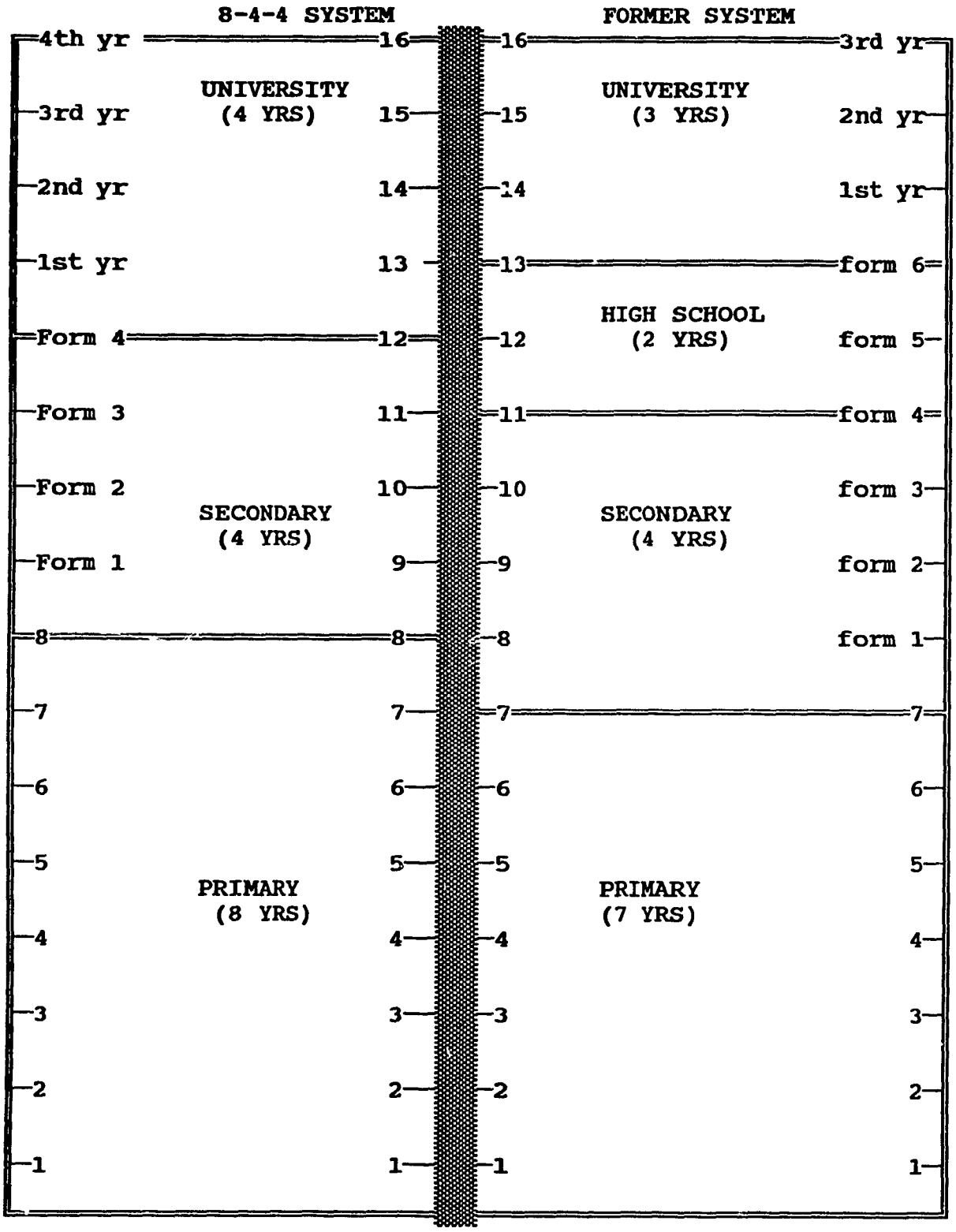
Emphasis is laid on practical skills, independent learning, and continuous assessment, and it is geared toward preparing pupils at the primary school level to be productive irrespective of whether they continue their education to the secondary school. In other words, the new system aims at preparing the students to be skilled enough to function effectively in the job market after eight years of primary education.

In precise terms, the change in the system was mainly felt in two areas: first, it necessitated the refurbishing of the school curriculum; and, second, the education program was restructured with all the attendant implications.

The second area - the restructuring of the educational program - was directed toward retaining the same sixteen years of school from class one to university, but unlike the previous structure, duration of primary education was increased from seven to eight years, while that of the secondary level remained at four years. The high school education level was, in effect, removed. At the same time, university education for the ordinary first degree was increased from three to four years (see fig. 1). The change has also made it imperative to expand the physical facilities at all levels. The enormity of this requirement can be evident in the 1988 intake into the university. During 1988 alone, five new constituent colleges of the local universities had to be opened instantly in order to admit roughly 8,000 new students. Yet, the problem is not over with the anticipation of the year 1990 when the first group of the 8-4-4 secondary school program would mature and, together with the last lot of form six leavers, seek admission to the institutions of higher learning. All together, about 200,000 students are expected to graduate from secondary and high schools towards the end of 1989, and only about 10,000, or 5%, will probably get a place in the local universities the following year (Ngweno, February 3, 1989).

The first area - the overhaul of the school curriculum in the primary school - is the interest of this study. The overall goals of the new 8-4-4 system of education for the primary

FIG. 1. KENYA'S EDUCATION SYSTEM: THEN AND NOW



schools as stated in the primary schools syllabus (Kenya Ministry of Education, Science and Technology, 1986, p. xii) are intended to provide learning opportunities to a given child so as to:

1. lead to the acquisition of literacy, numeracy, and self reliance, and manipulative skills;
2. develop self-expression, self-discipline, self-reliance, and utilization of the senses;
3. develop ability for clear logical thought and critical judgement;
4. be exposed to meaningful experiences which will lead to enjoyable and successful learning and the desire to continue learning;
5. acquire a suitable basic foundation for the world of work in the context of economic and manpower needs of the Nation;
6. appreciate and respect the dignity of labour;
7. develop desirable social standards and attitudes;
8. develop awareness and understanding of the immediate environment and foster positive attitudes to other countries and to the international community;
9. grow into a strong and healthy person;
10. develop a constructive and adaptive attitude to life based on moral and religious values and his responsibility to his community and the Nation;
11. appreciate his own and other peoples' cultural heritage, develop aesthetic values and make good use of leisure

12. grow towards maturity and self-fulfillment as a useful and well adjusted member of society.

The changes which the new curriculum caused while trying to achieve these goals were profound. For example, the scope and content of the primary school courses was increased and expanded considerably. While in the former system the subject groups required for the Kenya Certificate of Primary Education (KCPE) examination were only three, they were increased to eight in the new program. At the same time there was an increase in the practical and vocational courses, namely, Home Science, Business Education, and Agriculture for primary schools. The complete list of subjects taken in the upper primary school is given in Table 1. As for the secondary schools, the compulsory Kenya Certificate of Secondary Education (KCSE) examination subject groups have increased from six to ten. All this rapid expansion has taken place without a parallel increase in the time to cover the courses. There has also not been time to re-train teachers so that they are better prepared to re-focus their teaching to the ideals of the new curriculum. Equally important, there was simply no time to design and develop materials and methodologies appropriate to teach the additional skills effectively. The problem of design and development of learning materials is particularly disturbing and can be summarised by the words of the current Director of Education:

A major obstacle to the rapid progress of the (GEOGRAPHY HISTORY & CIVICS) subject is the absence of teaching materials. The Ministry of Education is determined to ensure that relevant textbooks are produced (Kenya Institute of Education, 1988).

TABLE 1. THE DISTRIBUTION OF SUBJECTS FOR THE 8-4-4 IN THE UPPER PRIMARY SCHOOL

SUBJECTS	NO. OF PERIODS	TIME
Art Education	3	35 min. ea
Craft Education	4	35 min. ea
Agriculture	3	35 min. ea
Business Education	3	35 min. ea
English	7*	35 min. ea
GHC (Geography, History & Civics)	4	35 min. ea
Home Science	4	35 min. ea
Kiswahili	4	35 min. ea
Mathematics	6	35 min. ea
Music	2	35 min. ea
Physical Education	3	35 min. ea
Religious Education	3	35 min. ea
Science	3	35 min. ea
Total	50	

* One period is reserved for a library session.

It would be expected that the problem of development of learning materials for a new system like this would be assuaged by the government determination to maintain some specified quality standards before such materials are released for use in the schools. This, however, has not been the case and there is a clear lack of determination, let alone guidance from the Ministry of Education, to enforce matters pertaining to development of

quality textbooks and other learning materials. This unfortunate state of affairs has already become a major issue to the ministry concerned, as well as to curriculum developers, instructional designers, educational administrators, and teachers.

As would be expected under the circumstances, the school scene has seen a flurry of activities by both government and private publishers, and there has been pressure to generate enough titles of books to schools. Older textbooks were no longer considered suitable, although in certain cases there was evidence that some unscrupulous publishers only changed the outer, easily visible parts of the book and gave it the new "8-4-4" look. In an attempt to fill the vacuum hurriedly, many books which have not been certified suitable through some kind of evaluation flooded the market within a matter of only a short time, and the schools are making them available to learners. Parents have been complaining about possible collusion between some teachers and the publishers to create demand for their books among unsuspecting children, and complaints over the quality of textbooks have already started to emerge (Mutahi & Anjili, 1989). For a long time the textbook development activity has been a matter of shared responsibility between the government and the private publishing sector (Ng'weno, Feb., 1989). The government operates two publishing firms which specialize in publishing for the primary and secondary school market. The fact is, the government has not been able to meet all the textbook requirements in this area by itself. This has created room for development of a reasonably

strong private publishing sector mainly dominated by multinational companies such as Heinmann, Longman, Macmillan, and Oxford University Press. With the appearance of the 8-4-4 system, however, numerous local publishing concerns have sprung up in a bid to cash in on the lucrative new textbook market giving both the government and the multinational publishers some challenge (Ng'weno, Feb., 1989). The challenge from the small publishers could, however, be viewed shortlived as the government has already started the process of playing a leading role in the textbook publishing for both primary and secondary schools and is gradually controlling the textbooks schools can recommend, mostly favouring those published by the two government publishing firms, namely, Kenya Literature Bureau and Jomo Kenyatta Foundation. As can be observed from the vibrations occurring in the publishing industry, it seems the major preoccupation presently is directed to producing adequate numbers of textbooks without consideration to quality and overall improvement of teaching strategies and learning styles. Does this tie with the goals of the 8-4-4 system of education? No, not really.

This leads one to conclude that recent developments in education in Kenya in general, and in the development of educational materials in particular have not encouraged the process geared towards efficiency of the education system and the effectiveness of learning materials.

In Search of a Remedy

The words of Hill (1969 p. 299) provide a pointer to the desirable direction of the concerns:

> In the few years, the more developed countries have been actively engaged in sweeping programmes of curriculum reform, embracing mathematics, the sciences, the teaching of English and other languages, and all the subjects in varying degrees. The research on which these developments are based require large concentrations of skilled manpower and technical resources. Experimental material has to be tested and evaluated on a wide scale before its publication in book form is possible. Increasingly, the book is no longer enough by itself. Scientific equipment, rural and visual aids of every sort, have to be originated and developed... The traditional book will steadily be supplanted by a whole educational technology.

The solution of the problems analyzed above lies in the recognition of four areas of concern: first, the need to be clear about the goals of the specific courses within the 8-4-4 system of education. This would constitute the criteria for evaluating the effectiveness of these materials; second, the necessity to determine the order in which specific objectives of the courses would be approached; third, the instructional procedures aimed at

effective attainment of specific skills should be considered when developing learning materials; and fourth, suggestions for the most appropriate instructional strategies for each cluster of objectives to attain maximum results. Consideration of these four areas of concern is tantamount to identifying ways to maximize learning materials effectiveness.

The project of designing an instructional game was conceived as one of the possible ways through which the problem of covering the crowded curriculum within the period available effectively could be addressed. In order to accomplish this, the education system should identify the most effective means of improving the instructional techniques in general, and making learning - and teaching for that matter - much more interesting. Thus, it became the purpose of this thesis-equivalent to design and evaluate an instructional game which would provide primary school students with additional learning materials to achieve verbal knowledge content in Geography, History and Civics (GHC): A Combined Course. The general goal would to address the fourth area of concern stated above, with the specific mandate being to better prepare students to learn the more complex parts of GHC syllabus under normal teacher-led classroom sessions.

Clarification of Concepts

Heinich et al (1986 p. 300) give a deserving opening to the clarification of the concepts treated in this study:

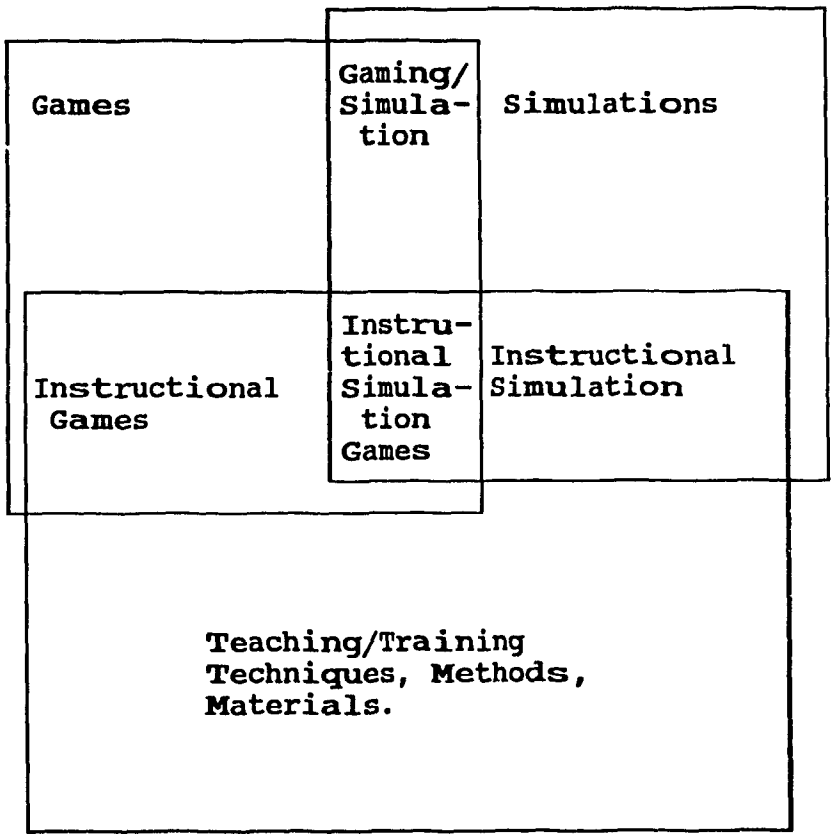
> Games are, above all, a form of play. (They) can provide attractive and instructionally effective frameworks for learning activities. They are attractive because they are fun! Children and adults alike tend to react positively to an invitation to play. Games are a welcome break in the day to day routine of the classroom or training program. Novelty reduces boredom for adults as well as for children. The pleasant, relaxed atmosphere fostered by games has proven to be highly conducive to efficient learning.

This positive comment and the tribute accorded to games as instructional tools above provides strong persuasion to a teacher who would want to consider trying to use it in the classroom for teaching.

According to Random House dictionary of the English Language (1966, p. 582), a game is a "competitive activity involving skill, chance, or endurance on the part of two or more persons who play according to a set of rules, usually for their own amusement or for that of the spectators". The literature on instructional gaming, however, abounds with conflicting terminology. When authors refer to instructional games, they seem to be discussing concepts that are related in usage. Consequently

terms such as games, simulations, simulation games, and gaming simulations, tend to be used interchangeably, sometimes referring to the same, at other times to different things. Figure 2 shows the three components and combinations possible which might be included in a conceptual model.

FIG. 2. CONCEPTUAL MODEL OF GAMES/SIMULATIONS



Greenblat (1971) describes simulation as a kind of model which is dynamic as opposed to the traditional models used in education such as verbal, graphic, mathematical, and physical, which are static (Greenblat, 1975; Raser, 1969) for the reason that it demonstrates the way a system behaves. The term gaming or game has characteristics unique unto itself. "Players have goals, sets of activities to perform, constraints on what can and cannot be done, and payoffs (good and bad), as consequences of their action (Greenblat, 1971, p. 713). The term gaming simulation contains characteristics of gaming and those of simulation. Like games they have goals, and sets of activities to perform; like simulation, there exists characteristics of a dynamic model-patterned, as it were, from real life: the goals, activities, constraints, and consequences - simulate or model those elements of reality (Greenblat, 1971) . The concept of instruction is represented by teaching-training methods, techniques, or materials used in the classroom for improving learner performance. A combination of all the three components results in variety of games/simulation (see fig.2). Out of the combination of all the three components, Greenblat (1981) classifies some games under the concepts teaching, instructional simulations, simulations, games-simulations, teaching games, games, and gaming simulations.

Teaching involves training techniques and materials such as lectures, case studies, discussions audiovisual materials, field study, and others. Instructional Simulations include non-game

simulations such as flight simulators for pilots and programs in which disasters are simulated to teach and train medical and paramedical personnel to deal with real world disasters when they occur. **Simulations** are designed for research purposes, for instance, non-game, non-teaching simulations, as used to predict outcomes of political events, for example, presidential elections; **Games-Simulations** are those played by people at home for leisure, or to pass time, for example, DIPLOMACY. **Games** are played for fun, amusement, to pass time, develop strategy and critical thinking, or any number of purposes (eg. SCRABBLE, MONOPOLY). **Teaching Games** are used for teaching purposes; for example, WIFF "N PROOF, EQUATIONS, ON WORDS, TEACHERS' QUIZ FUN GAME, and others; and, **Gaming Simulations** are used for teaching and training, for research and public policy .(Eg. METRO-APEX, CLUG, GHETTO) and such others. The distinction among the various concepts does not appear so obvious. Heinich et al (1986) provide some clarification.

> A game is an activity in which participants follow prescribed rules that differ from those of reality as they strive to attain a challenging goal...attaining the goal usually entails competition. The competition may be individual against individual, as in chess; group against group, as in basketball; or individual against a standard, as in golf (with "par" as the standard). In playing video games, players typically are competing against their own previous scores,

and ultimately against the designer of the game as they approach mastery of the game.

Striving to attain a challenging goal does not always have to involve competition. As Heinich et al (1986, p. 306) point out:

> Communication games, fantasy games, and "encounter" games exemplify a whole array of activities in which participants agree to suspend the normal rules of interpersonal communication in order to pursue such goals as self-awareness, empathy, sensitivity, and leadership development. These activities are considered games but do not entail competition.

On simulation, Heinich et al (1986, p. 307) offer the following description:

> Simulation is an abstraction or simplification of some real life situation or process...participants usually play a role that involves them in interactions with other people and/or with elements of the simulated environment...A simulation game combines the attributes of a simulation (role-playing, a model of reality) with attributes of a game (striving towards a goal, specific rules). Like a simulation, it may be relatively high or low in its modelling of reality. Like a game, it may or may not entail competition.

The application of any game, or simulation game for that matter, to help someone to learn new skills and values which can be applied outside of the game itself, say, to accomplish a given task such as correct spelling, or arithmetic calculation, can be said to be instructional. But even those games that do not normally play instructional roles could sometimes acquire instructional value. Heinich et al (1986, p. 307) demonstrate this:

> Admittedly, the attribute of being "instructional" is often a matter of degree. The stated intentions of the designer or user would have to be examined closely. For example, basketball - normally a non-instructional game - could be assigned by a football coach to his players as a means of developing agility and faster reflexes. In such a case, basketball would be "instructional" for that situation".

Heinich's thesis appears to state that the greatest attribute the game can have is its ability to provide a fun-like situation. This seems to agree with the principle of operant conditioning (Skinner, 1953) which can be demonstrated in the application of instructional games in the classroom. Pleasurable consequences gleaned from making correct responses to a question will strengthen the behaviour, ie. the possibility that the player will respond accurately the next time the question is asked. The rate of recall of facts will be augmented by the amount of

reinforcement received and conditioning effected as the game progresses towards the goal, i.e. winning. The game, therefore, provides a vent for releasing the conceivable energy that can be invigorated in an individual during a playing session. The challenge is on the instructor who is expected to use instructional strategies that will place the student in the most frugal and satisfactory environment for learning. The use of games for instruction means harnessing the delight acquired in gaming situations and redirecting it to some potential learning activities, such as learning a dull subject, what is, in many cases, verbal knowledge. The learner may, or may not, even know that he is learning. In the process of having fun, the student will meet labels, facts, pieces of organized knowledge, and such others, repeatedly. These forms of knowledge will register in the students memory without consciously trying to do so. Later, perhaps, the same, or other different methods will be used to help the learner achieve higher order skills.

Historical Background

The use of games for any purpose has a long history. Games/simulations can be traced back to about 3000 BC in China when a war game known as WEI-CHI was played (Heinich et al, 1986). The game later spread to Japan around the 8th century and is considered the mother of to-day's game GO. Most other offsprings and modifications to the game are traceable to India in form of CHATURANGA, and to the west in form of CHESS. Many Nations' armies have used games/simulations for training to get the best out of their men, sometimes attributing major real war victories to the preparedness given to them through practice in such games. The advent of the computer toward the end of second world war boosted the technology of war gaming. Today, playing computer games is one of the most frequent pastimes for the young and the old alike in the industrialized countries.

The first real attempt at using games for educational purposes developed in the 1950s and was dominated by crisis type games. Simulation games were used to sort out critical issues within the framework of rules structured to reflect the conditions of the simulated crisis situation. These techniques spread to universities where they became popular instructional methods. Students of international relations could play the roles of decision makers in government and try to settle some hypothetical problems.

Games have been developed to cater for special interests such as business, international relations, and, of course, education

in the classroom. Economics and business management were among the early beneficiaries of academic games. This resulted from the fact that they had already developed well-defined, quantitative models upon which simulation/gaming could be based. In a way, business games and crisis games were based on the earlier version of military war games where the business environment was viewed as a battlefield; the takeovers and mergers frighteningly equated to conquests and vassalage on the war front.

Classroom games/simulations were spearheaded by Abt Associates in the 1950s (Heinich et al, 1986), a U.S. consulting firm specialising in designing and perfecting games/simulation for academic use. Their efforts coincided with the period when educators were promoting the inquiry-oriented approach to teaching and learning and when educational innovation received considerable attention from the likes of Bruner and Dewey. Abt Associates have designed a wide range of games/simulations among which are POLLUTION, NEIGHBORHOOD, EMPIRE, MANCHESTER, COLONY, CARIBOU HUNTING, among others, and, even for Kenya, GITHAKA, (named after the Gikuyu name for the estate of a clan), "a settlement-pattern game in which children recreate the land use system of the (G)ikuyu tribe, acquiring land, wives, and houses". (Glazier, 1969).

John Hopkins University also started an Academic Games Program in the sixties which increased respectability for the application of gaming/simulation in the classroom. The programme under the direction of James S. Coleman from 1966-1973 developed such games

as LIFE CAREER, DEMOCRACY, GENERATION GAP, and GHETTO, among others. They have also been deeply involved in carrying out studies to determine the problems associated with the use of games and simulations for academic purposes.

Formal instructional games have not been used in Kenya for long. Those foreign games found are likely to have been brought by returning students, diplomats, and businessmen from abroad and the use of games in schools is uncommon. However, many students seem to be familiar with such games as SNAKES AND LADDERS, SCRABBLE, CHESS, and the DRAUGHTS, among others. Games normally sold in American, Canadian, or European departmental stores are likely to be found in the toy shops in Nairobi but they are very expensive. Only the expatriates and children from affluent homes are likely to be able to afford to buy them. It is not difficult to guess how the other children come to be so familiar with many of the foreign games. Sometimes being in contact with the children from affluent homes is all that it takes to establish such familiarity, children being adaptable and friendly to each other irrespective of economic differences or racial differences. Some of the familiarity may, however, have come about because printers of exercise books boost their sales by occasionally drawing some form of the popular games on the cover of the exercise books students use. Schools rarely provide games for classroom use and gaming in the sense used here is not a teaching strategy commonly applied in Kenyan schools. The introduction of Gitumbi's REVISION FUN GAME, the name given to the instructional

game to be designed and evaluated in this study, is among the first attempts to make games available as a formal instructional strategy to Kenyan schools. It also represents the first attempt in Kenya to apply an instructional game to cover a large portion of the existing curriculum, and to compete directly with the traditional textbook format.

CHAPTER TWO

Literature Review

Application of the Game Strategy

The literature reviewed here tends towards two areas: studies on gaming and simulation, on the one hand, and learning of verbal knowledge, on the other.

Twelker (1970) and Campbell (1978) hold the view that enough studies on the effectiveness of games have been created to indicate that games are powerful instructional strategies. Greenblat (1975 p. 188) also states that positive data have increased regarding the effects of instruction using games. She observes that in the cases where evidence does not reveal benefits from gaming strategies over other modes of teaching, at the same time it does not show the reverse effect, that is, those taught using games do not appear to have deteriorated in their performance.

In order to show the effectiveness of games in learning, learners must demonstrate that they have changed both in attitude toward the subject matter and the game itself (Campbell, 1978). Fletcher (1971) states that to claim a game teaches knowledge implies an ability to measure this knowledge independent of the game. He observes that independent measures are more difficult to develop as they become complex. Measures used in research on games effectiveness are, therefore, similar to those used in measuring knowledge gain by other teaching methods. An important observation is that learning with games is a by-product of a

different goal, that is, winning. Motivation to learn is intrinsic in that it is a by-product of motivation to win in the game (Boocock & Schild, 1968; Coleman, 1971; Tansey & Unwin, 1969). Concepts can be embodied in a game so that players are compelled to recall and/or process them in order to succeed in the game (Bloomer, 1971). Games communicate very efficiently the concepts and facts of many subjects (Abt, 1971). Games are considered to be effective means of learning because they are particularly well suited to attainment of cognitive objectives, especially those involving recognition, discrimination, or drill and practice, such as grammar, phonics, spelling, arithmetic skills, formulas (physics, chemistry, logic), basic science concepts, place names (geography), and terminology (history, civics, language) (Heinich et al, 1986, p.310).

Allen et al (1966) found that students who played the WIFF'N PROOF game did much better than the control group. Baker (1969) also found the experimental group participating in a history game performed better on content tests than did the control group. Bowen (1969) used the game WIFF'N PROOF with fourth grade students and found no significant difference in mathematical performance in the students who played the game and those who did not. In three studies, Garvey and Seiler (1966) compared factual and conceptual knowledge of high school students learned by playing INTER-NATION simulation. All three studies failed to show significant differences in student learning between experimental and control groups.

The effectiveness of instructional games on learning is due primarily to its motivational impact on players (Abt, 1970; Gamson, 1975, Heinich et al, 1986). Heinich et al (1986) state that games add motivation to topics which ordinarily attract little student interest, for example grammar rules, spelling, and math drills. Games create dramatic representations of the problem being studied (Abt, 1970, Coleman, 1971). Instructional games seem to have had the greatest impact in the domain of affective learning. Studies have reported positive student response after participating in a game. Cordtz (1969) evaluated a simulation game used in a graduate course and found that students in the experimental class expressed higher interest in the course and subject matter content.

Learning Verbal Knowledge

Authorities on learning and knowledge generally agree on the definition and characteristics of verbal knowledge. Verbal knowledge (or information) is defined as the category of knowledge that emphasizes remembering either by recall or recognition (Orlich, 1985). Knowledge objectives imply recall or recognition of specific elements in a subject area much in the same form as it was learned (Bloom, 1981; Orlich, 1985).

Verbal knowledge consists of labels or names, isolated or single facts, and organised knowledge (Gagne, Briggs, and Wager, 1988). Terminology, conventions, and criteria can each be the substance of verbal knowledge (Bloom, 1981; Slavin, 1986). Verbal

knowledge consists mainly of recalling specific facts and bits of information; recalling terminology, or definitions; recalling conventions or rules of usage (Orlich, 1985; Slavin, 1988).

Why should verbal knowledge be learned? Again authorities on learning seem to agree on the importance of verbal knowledge in learning every subject. Bloom (1981) states that recall of verbal knowledge itself has its own uses. Such knowledge as algebraic formulas help the learner in solving of exercises or "for the more general purpose of acquiring usable concepts about relationships between first-order and second-order equations". (p. 214). He insists that although after some time of disuse such facts may be forgotten, knowledge of them is extremely important for the development of ideas which do stay with us for interpretive and associational uses. Gagne et al (1988) state that students learn a host of facts in connection with their studies in school. A specific fact is related to others in a total set, or to a larger body of information. This situation is particularly prevalent in studies involving socio-economic issues such as geography, economics, culture, and government, among others. Particular information may be needed for the learner to continue learning a topic or subject through recall and use again and again. Future learning will be more efficiently conducted if it is acquired and retained. Much of the verbal knowledge may be continually useful to the individual throughout life. Examples of this are plenty, but letters of the alphabet, numerals, and common objects, will suffice (Bloom, 1981,; Orlich, 1985). Verbal

knowledge forms the basis for other categories of knowledge, that is, comprehension, application, analysis, synthesis, and evaluation. It provides the background subject matter on which the higher order categories are based (Bloom, 1981; Gagne, 1985, Orlich, 1985).

Tasks that involve reasoning and understanding require that you remember the facts in order to reason with them and understand them (Higbee, 1978). Children often learn things as facts before they understand them as concepts or skills. For instance, a child may learn a formula for the volume of a cylinder as an arbitrary fact long before she understands why the formula is what it is (Slavin, 1988). Adult studies, particularly in the sciences, have many examples of this type.

How is verbal knowledge learned best? Factual materials must be learned as efficiently as possible to leave time and mental energy for meaningful learning such as problem solving, conceptual and creative activities (Slavin, 1988). The most commonly used strategy of committing information to memory is by practice. Information received in short-term memory must be mentally rehearsed if it is to be retained for even a short time, or until it is established in the long-term memory (Slavin, 1988). Drill and practice exercises on media frees the teacher to instruct students at higher cognitive levels. Drill and practice at lower levels also helps students to learn higher order skills at a greater leisure and more effectively (Orlich, 1985; Slavin, 1988). Through drill and practice, learners may attain the level

of automatization. According to Shiffrin and Schneider (1977), automatization is the process in which tasks require less and less attention as they become well learned. Many of the skills we teach children have become second nature to them consequently freeing their short-term memory (STM) for more complex tasks (Gagne et al, 1988). If children continually fail to learn some generalization or concept, then we must assume that they do not have the prerequisites by which to succeed. Use of a hierarchy model in sequencing instruction would account for weaknesses in pupil performance (Rosenshine, 1983).

During instruction verbal knowledge should be tested as one facet of evaluation. According to Bloom (1981), assessment of recall and recognition of specific facts is a function of formative evaluation so that we can know whether the learner can recall certain facts, terms or methods in order to identify weaknesses if they exist. Knowledge of a particular term, relationship, or operation is an essential part of the pyramid of prerequisite capabilities for the desired terminal behaviour.

Orlich (1985) notes that most of the teaching in schools tends to concentrate on verbal knowledge. He cautions that because of over-emphasis on verbal knowledge category, the thought processes of the students (and that of teachers) are kept at very low levels. Considering that recall of information is basically a passive operation and rarely actively involves the learner, students often feel poorly motivated when the major part of the instruction consists of memorization of facts. In order to avoid

this kind of situation, the methods of teaching verbal skills should be such that the learner is actively involved and interested to do so (Gagne, 1985; Orlich, 1985). Involving learners in creative group activities could create the appropriate environment for learning verbal knowledge in a more interesting manner. The use of computers has been valuable in teaching knowledge level content. Games and simulations have also been found to provide highly motivating instances for learning concepts and facts (Abt, 1971; Boocock and Schild, 1968; Campbell, 1978; Heinich et al, 1986).

The instructional game designed here aims at becoming an effective instructional tool to teach verbal knowledge along the lines reviewed here.

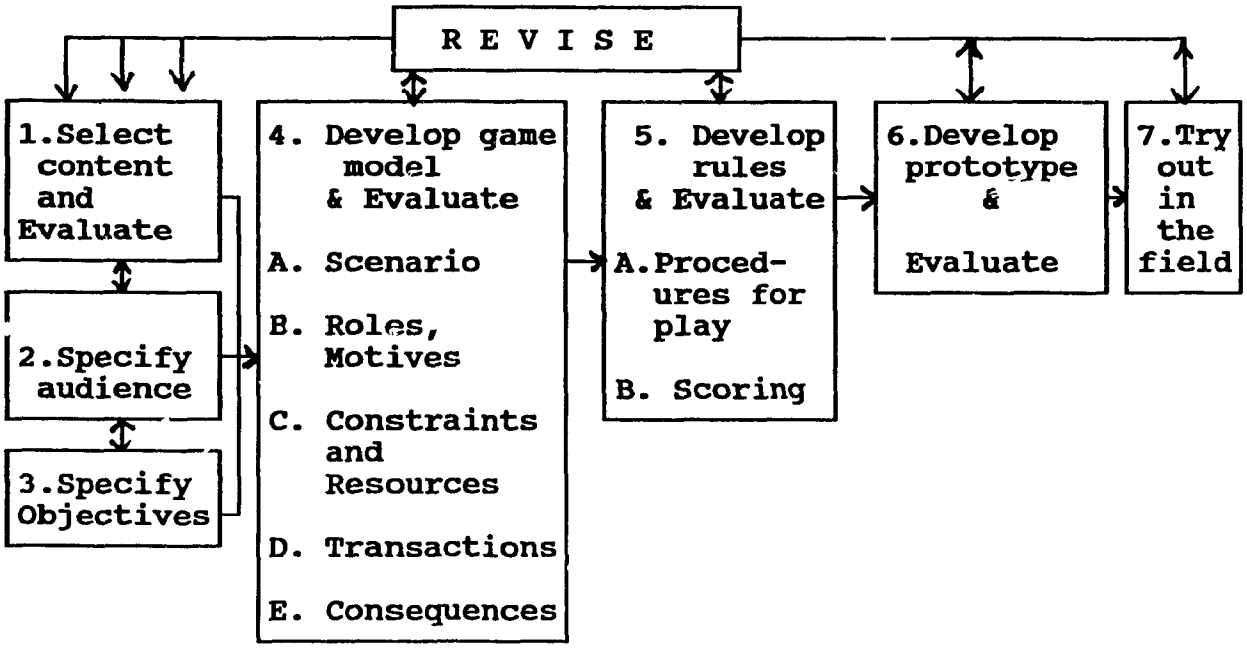
CHAPTER THREE

Design and Evaluation of the Instructional Game

Introduction

The design and formative evaluation of the instructional game, here-in-after called REVISION FUN GAME, was carried out using ideas from Heinich et al's (1986, p. 319) model of designing an instructional game, on the one hand, and from the three-stage model of formative evaluation of instructional materials (Dick & Carey, 1985), on the other (See fig. 3). Two sets of materials were developed to complete the package which constitute the REVISION FUN GAME: 1. The first set: the game package consisting of the playing board, one dice, five pawns, and a playing guide; 2. The second set: the quizzes consisting of test items with corresponding answers based on GHC: A combined course for standard six class involving recall and recognition of labels or names, single or isolated facts, and chunks of organized knowledge in the subject (Slavin, 1988). Development of the two packages was carried out almost independent of the other and evaluated as such, as will be demonstrated.

FIG. 3. REVISION FUN GAME DESIGN MODEL



Selection of Content

Development of Content

The subject matter selected for the purpose of this study was GHC (Geography, History and Civics): A combined course covering standard six syllabus of Kenya's 8-4-4 education system. The content was derived mainly from the following sources:

1. Kenya Institute of Education, (1988). Primary GHC: A Combined Course: Pupils' book for standard six. Nairobi: KLB.

2. Ministry of Education, Science, and Technology, (1986). Syllabuses for Kenya Schools: Volume 2: Upper Primary. Nairobi: Jomo Kenyatta Foundation (See figure 4).

FIG. 4. THE GHC SYLLABUS FOR STD SIX

THEME: Kenya and Her Neighbours

I. The Physical Environment

a. Position, size, and shape of Kenya and her neighbours.

b. Main physical features: Mountains, hills, rift valley, drainage.

c. Climate and seasons: Rotation of the earth, time.

d. Vegetation: Zonal distribution of vegetation in eastern Africa; forests, grasslands, scrubs, reeds, etc.

II. The Peoples of Eastern Africa.

a. The main language groups in Uganda, Tanzania, Ethiopia, Somalia, and Sudan.
   i. Bantu
   ii. Nilotes
   iii. Cushites
   iv. Semites

b. The other communities found in eastern Africa: Europeans, Asians, Arabs, etc.

c. Origins and reasons for migration and settlement in eastern Africa of the:
   i. Bantu
   ii. Nilotes
   iii. Cushites
   iv. Semites
   v. Other communities.

d. Factors influencing the distribution of people in the region.
   i. Physical factors: relief, climate, soil, vegetation.
   ii. Economic
   iii. Social
   iv. Political

III. Economic Activities.

a. Agriculture

i. Cash crop farming: Coffee in Kenya, Tanzania, and Uganda; fruits in Somalia.
ii. Subsistence farming: bananas in Uganda, maize in Kenya and Tanzania.
iii. Livestock farming in Somalia and Tanzania.
iv. Diary farming in Kenya.

b. Mining
i. Diamonds in Tanzania
ii. Copper in Uganda
iii. Cement in Kenya and Uganda.

c. Fishing industry in Kenya, Uganda, Tanzania and Somalia.

d. Trade
i. Traditional trade among eastern African people.
ii. External trade.

V. Political Development.

a. Traditional political systems with specific reference to Buganda, the Empire of Ethiopia under Menelik, the Nyamwezi, the Somali.

b. Political systems during the colonial period: The British in Uganda, the Germans in Tanganyika, the Italians in Somalia.

c. Nationalism and attainment of independence in Sudan, and Tanganyika.

d. Present systems of government with specific reference to Ethiopia, Tanzania, and Uganda.

e. Great East Africans.

VI. Social - Economic Issues.

a. Family life education.
i. The roles and interdependence of family members.
ii. Consequences of having many children.

b. Undesirable social habits: cheating, stealing, disobeying elders, laziness, hoarding of goods, forgery, smuggling, corruption, illegal trade, stock theft, etc.

c. Drugs and alcohol
i. History of drug use and control in Kenya.
ii. Motives that drive people to use drugs.
iii. Effects of drugs, alcohol, and smoking.

VII. The Roles of the Citizens in Society.

a. Co-operation with all government functionaries

b. Respect for public property and other peoples' property.

VIII. The Road Safety.

a. Enforcement of traffic rules

b. Co-operation between the public and the police in road safety.

The content was developed in form of quizzes consisting of questions with corresponding answers for each question. The quizzes represented all the identified topics of the syllabus with emphasis on adequate representation of every subtopic. The designer of the instructional game package and a teacher, who has successfully taught the subject for the last three years, studied the material together and isolated all the subtopics in the syllabus. The test items representing the verbal knowledge in the subtopics were constructed each with its corresponding answer, much like the construction of embedded tests. Embedded tests consist of a single item that tests a single objective, or may be a test consisting of a large number of items for a large number of subtopics. Items are included as part of the instructional strategy and may appear every few pages or after a major sequence of instruction (Dick & Carey, 1985; Gagne et al, 1988). In consideration of the game approach, embedded tests basically

constitute the quizzes part of instruction. All together a battery of 976 test items, here-in-after called REVISION FUN QUIZZES, were developed and placed on 5" by 3" cards (see fig. 5). An assumption was made that students who acquire the knowledge represented in the quiz content would have acquired most of the basic knowledge applicable in the subject under study.

Evaluation of Content

Subject Matter Experts.

The Revision Fun Quizzes were given to two teachers separately. The teachers had each taught the subject for a minimum of three years in reputable schools and had a reputation of successfully capacitating high percentages of their students to pass in the GHC subjects in the Kenya Certificate of Primary Education examination. They were, therefore, well versed in the GHC subject matter and the syllabus. The teachers were required to respond to four specific questions:

1. Do you consider that all the possible subtopics are represented in the quizzes? If not, write down the missing sections.

2. Do you consider that all the answers to the quizzes are accurate? If not, indicate on a separate paper those items that are not.

3. Do you consider the language level, and the format of the

quizzes suitable for standard six learners? If not, indicate in writing those that you consider are not.

4. Describe any problems you consider might affect the learning of the knowledge contained in the quizzes.

The subject matter experts' views were considered during revision of the content.

One-to-One Evaluation of Content

Three students were selected for this part of evaluation. The students were chosen on the basis of their past school performance in GHC, one from the lower ability group, one from the average group, and the other from the above average group. All the learners came from the same school and classification of their abilities was obtained from school records.

The students were individually informed that they were only helping the designer in validating the content and that they were not being tested for other reasons. Each was asked to read the quizzes and identify the corresponding answers. They were also encouraged to indicate whenever they had difficulty in understanding or reading of any word, phrase, or sentence. In each case, the designer noted any difficulties on a master sheet using separate colour codes for each student's difficulties. The purpose of the one-to-one evaluation of the quizzes was to identify at the earliest possible time if they would pose difficulties to the target learner in as far as the entry behaviour is concerned, that is, his/her ability to read and

communicate clearly with other students during the play sessions. (Dick & Carey, 1985; Pophan, 1975).

Early Revision of Content

The Subject Matter Experts and the One-to-One evaluation of content revealed some items that required modification. Students had difficulties reading some foreign personal and place names particularly in history where names represented diverse nationalities such as German, Italian, French, and some local tribal names. In order to correct this problem, it was decided that the instruction to teachers would include the list of names and terms that would be taught to students prior to the start of the game sessions. Other revision points included spelling errors, unclear statements or quizzes that might elicit more than one answer, and a few distorted expressions. The SMEs found the quizzes generally suitable for the standard six class and to have covered the syllabus fairly comprehensively. Both SMEs, however, expressed their fear that the test items might be too difficult for the learners in the sense that they appeared in a format students were generally not used to, that is, fill-in-the-blank type. The learners were familiar with the multiple choice type questions. The designer was, however, satisfied that this type of questions would be suitable for the purpose the game is constructed.

Specification of Audience

For the purpose of this project, class six pupils were the subjects. These students are of both sexes and average thirteen

years of age in their sixth year of primary education. They should, on average, be able to read and speak English fairly fluently as well as to write it clearly. They have already covered GHC courses for the earlier classes and, therefore, were expected to be familiar with the substance of the course. The students had also covered approximately two thirds of the GHC for class six at the time of the introduction of the REVISION FUN GAME.

Specification of Objectives

The general objectives of this instruction are that the game will: 1. provide the teacher with the mechanism whereby he would upgrade his teaching above the verbal knowledge level by providing an alternative to ensure that knowledge level is covered through the instructional game; 2. motivate the students to review the facts of geography, history and civics for standard six that they are reluctant to memorize or which they are likely to forget rapidly; 3. provide students with immediate feedback about which areas of the course they are weak in; 4. provide an environment wherein students could learn, not simply from the game and the teacher, but also from each other in small groups; 5. provide all students with start-off knowledge on the subject matter in a highly enjoyable setting; 6. free the teacher from being the initiator through teaching to being a helper of students with individual problems. Specifically, the participants will be able to: 1. reach a mastery level of 60 percent after ten

hours of play over a period of two weeks to be determined by a posttest; 2. show evidence of improvement in learning of verbal knowledge; 3. show desire to want to have this method of instruction used often with the class, and individually at home, to be determined by an attitude questionnaire; and, 3. show evidence of liking the GHC Course to be determined by an attitude questionnaire.

Revision Fun Game Design Model

Game Model Design

REVISION FUN GAME was modelled on Waddington's TEACHERS' FUN QUIZ 2, a learning game developed by Waddington on the SNAKES AND LADDERS principles. The model is designed to entertain and can be used to teach knowledge which includes sciences, spelling, recreation and sports, and history, among others.

The REVISION FUN GAME consists of the following:

1. A playing board with square graphics numbered from one to a hundred in Arabic numerals (see fig. 5). Eleven of the square boxes contain messages to "GO TO" several squares up and eleven other squares instructing the player to "GO TO" several steps back, depending on luck during play.

2. Five pawns representing the number of players in any single session. Each pawn is coloured differently from the others to make player identification easy.

3. One six-sided dice. Two of the opposite sides are inscribed with either one, two, or three white dots.

4. The playing guide. These are rules and procedures governing the game play (See Fig. 7).

Evaluating the Game Model

The Revision Fun Game provides a setting for participant competition through luck as well as through the ability to correctly provide correct responses to the quizzes. Evaluation of the game model had the objective of establishing whether the participants would be able to make the necessary moves in order to compete successfully. The game was therefore evaluated on the following criteria:

1. Is the participant able to grasp the primary goal of the game, that is, winning?

2. Is the participant able to make the necessary moves, including respecting the chance factor, in the game?

3. Do the participants manifest signs of having fun?

4. Can the game sustain interest for a period of one hour at a time?

5. What group dynamics, such as conflict, consensus, etc., can be observed during play?

FIG. 5. THE PLAYING BOARD

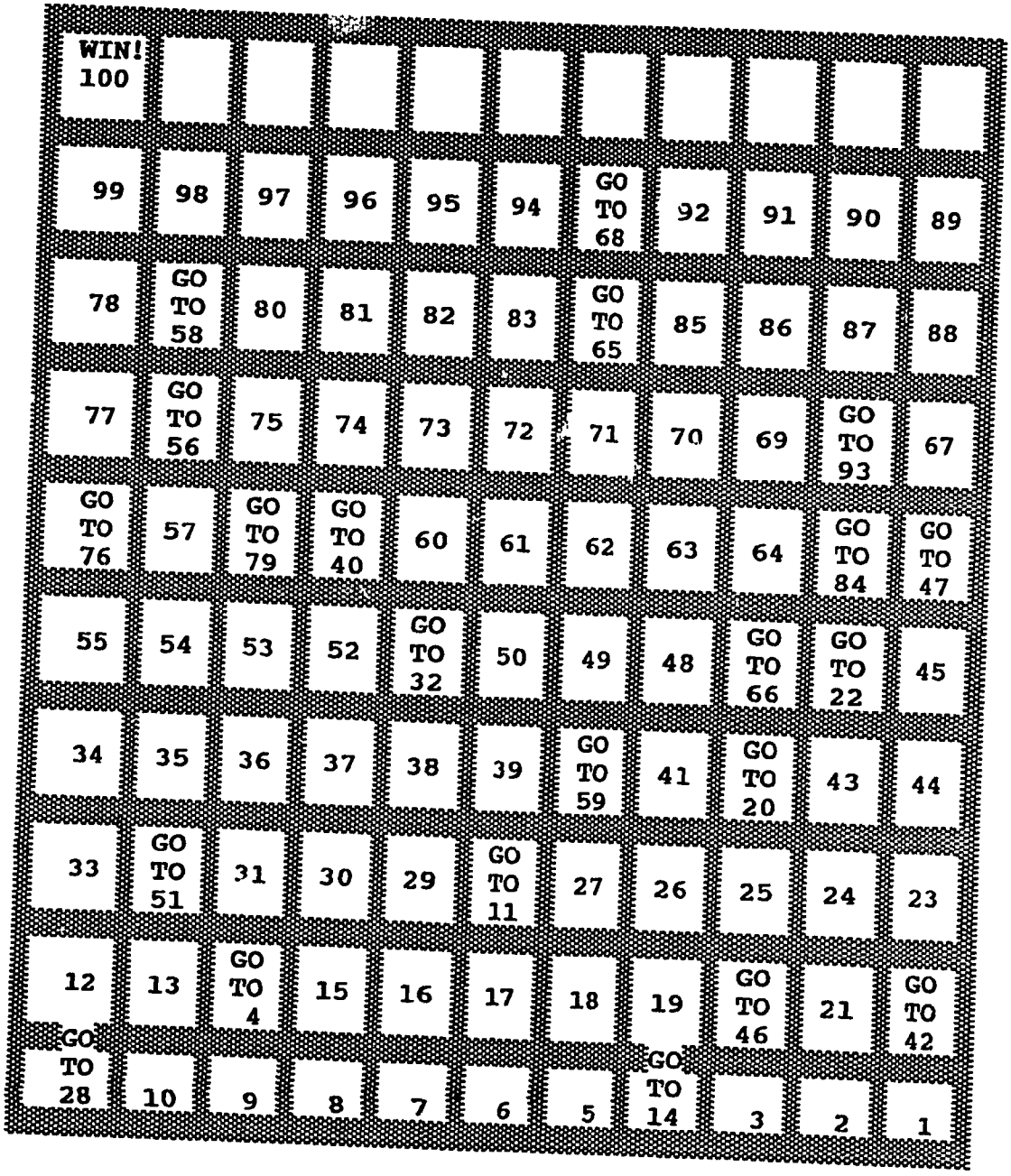


FIG. 6. REVISION FUN QUIZZES IN CARDS
(Sample card)

SIDE A

A GHC 6

1. Into what do rivers Nyando, Nzoia, and Yala drain?
2. Into what does river Turkwell drain its waters?
3. Which river drains into Lorian Swamp?

1. L. Victoria 2. L. Turkana 3. R. Eyaso Nyiro

SIDE B

B GHC 6

1. In which year did the Greeks conquer Egypt?
2. Which is the old name for Sudan?
3. In which year did Egypt become part of the Roman Empire?

1. 322 BC 2. Nubia 3. 30 BC

To answer these questions, a group of children from diverse backgrounds and schooling levels were invited to play the game. The game play involved rolling the dice to select the number of moves, moving the pawns on the playing board, reacting to the instructions on the board and competing to win. It was not found necessary to involve the quizzes at this stage since it would make it difficult to evaluate the difficulties associated with the game itself.

The designer demonstrated for five minutes the procedures of playing. Then he left the children to play and made unobtrusive observation of what was happening throughout the one hour of playing session.

The observation revealed that children can play and enjoy the game irrespective of educational level so long as they are able to understand the basic moves. Secondly the game can be played independent of the quizzes for entertainment. The children were captivated by the play and the involvement level was quite elevated. After grasping the rudimentary moves, participants quickly disregarded the presence of the designer and were engrossed in winning. In fact, the players were dejected when the designer discontinued the game session. The chance factor brought sudden interjections from the group and it was possible to detect acceptance of the fate, as it were, from the unlucky ones, whenever there was a "GO TO" a lower position. The chance factor served to provide the same chances to all irrespective of

individual differences, which seemed to democratize the playing session.

Revision of Game Model

On the whole there were few requirements for revision of the game model. However, the following observations can be made:

1. The participants found it difficult to follow the numbering sequence at first. However, they quickly recovered from the problem and the designer considered it to be of little consequence.

2. Some children tended to lose their temper quickly, particularly if they were unfortunate to have to move backwards, instead of forwards. But they recovered quickly and were thrilled and happy when they were instructed to advance several steps ahead. The designer considered this to be a part of the game and should be left as it was.

3. The noise level was rather high. This factor would be observed keenly during the field trial to determine what administrative requirements it would entail when used in a classroom situation.

Developing Rules

The Playing Guide Design

Following on the observations made during the design of the game and the quizzes, procedures and rules of play were

developed (See fig. 7).

Evaluation of the Playing Guide

Two sets of two primary school students were used to evaluate the playing guide. They sat with the designer, each set of two students separately, and were asked to read the playing guide and do as they were instructed. They were also issued with the game package together with several cards containing quizzes from the REVISION FUN QUIZZES. They were encouraged to indicate on the guide the parts they didn't understand. The designer made observations unobtrusively. Some of the observations made by the designer were as follows:

1. the students took too long to read the guide. The guide had too much information to be absorbed within a short time by the students.

2. the students seemed anxious to start playing and were reluctant to spend much time on the basics. However, they, seemed to catch up on the rules quickly after initial setbacks.

3. Some typographical errors were noticed during this session.

4. Pronunciation of some names and terms on the cards posed difficulties as has been noted elsewhere.

5. By the end of the hour, students had played the game twice. This seemed rather slow but it was the expected condition at the initial stages of play.

FIG. 7. REVISION FUN GAME PLAYING GUIDE

1. Set the playing board on a flat surface such as a table or a clean floor.
2. Place the dice where all players can see.
3. Each player should take one coloured pawn. Each player's pawn should have a different colour.
4. Select the first player. The next turn is for the player to the left, and so on.
5. The person playing will do the following: a. Roll the dice on a flat place so that it rolls several times. Once the dice stops on a flat surface, check what number is facing up. This should be 1 or 2 or 3. This number tells you: 1. the question number the player has to answer; 2. the number of squares on the playing board he can make if he gets the answer correct.
6. The person to the left of the current player reads aloud the question selected. The current player answers within fifteen seconds.
7. The person asking the question checks the correct answer on the card and announces aloud whether the answer is CORRECT! or INCORRECT!.
8. If correct the player moves his pawn TWICE the number shown on the dice. Example: 1 moves two places; 2 moves four places; and, 3 moves six places on the board. All players should start at position 1 on the playing board.

9. When your pawn stops at a position marked "GO TO" you will move to a position up if you get the answer correct; or you will move to the position down if you get the answer incorrect. Otherwise do not move at all. Example:If your pawn stops at "GO TO 14" and you are correct, then you skip to position 14. If you are not correct when you are in this position, you do not move at all. If you are in the position marked "GO TO 4" you can only do so if you fail to get a correct answer. If you get the answer correct you move the number of places shown on the dice.
10. The winner of the game is the first person whose pawn gets to position number 100 first.
11. The winner of the session is the player with the highest average scores for all the games completed during the play. The scores are attained and recorded for each player in the following order: No. 1 = 10 scores; 2 = 8 scores; 3 = 6 scores; 4 = 4 scores; 5 = 2 scores. Add the number of scores then divide by the number of games played during the session to get the overall position of each player.
12. The game can be made more attractive by introducing some rewards for the overall winner.

Revision of the Rules.

The playing guide seemed easily understood although the players lacked enough patience to read thoroughly all that it contains. They kept on referring, however, to the rules and procedures whenever they had a disagreement, or were in doubt about the correct move. It appeared that the guide would not be a problem after a few sessions of play. It was, nevertheless, found necessary to include with the teachers' guide the requirement that the teacher should introduce the game and explain the basic rules before the start of the first game so as to diminish the need to be dependent on the playing guide and to move quickly to unfettered play.

Try Out in the Field (Field-Trial)

Method

Sample.

Subjects were two groups of students in standard six class from two schools. One class had 48 students while the other had 46 at the start of the field trial. The study was done during the third of the school term meaning that the learners were about to complete the school year. All the students had been in school for the previous six years on average, and had by now acquired a fair ability to read and write in the English language which was the medium of instruction. One of the schools was a boys' only although there were three girls in the class; the other school was a mixed class, averaging 13 years.

Experimental design.

The design used for the field trial was the Nonequivalent Control Group design which is recommended for use with intact groups such as classes in schools (Campbell & Stanley, 1966). In this design "the groups constitute naturally assembled collectives such as classrooms, as similar as availability permits but yet not so similar that one can dispense with the pretest" (p. 47). The assignment of treatment to either of the groups is assumed to be random and under the experimenter's control.

One class was assigned to the Game-plus-Teacher group and would use the instructional game while still attending the regular class teaching, while the other class was assigned to the Teacher-Only group. This group would follow the regular classes but would not play the game during the study period.

Procedure and Instrumentation

The Pretest.

A random selection of 100 items from a battery of 976 test items that constitute REVISION FUN QUIZZES was used for pretesting two groups of students (See Appendix A). The purpose of the pretest was to determine the students' prior knowledge of the subject before they were exposed to the game. The fact that the students had already covered approximately two thirds of the course at the time of evaluation made the possibility certain.

The pretest also helped to estimate the level of mastery to be set for the students after playing the game for ten hours. In order to achieve 100% mastery level for 90% of the students, it would require constant use of the instructional game for a period of not less than 12 weeks playing one session a week. For our purpose, however, 60% mastery level for 60% of the participants will provide a reasonable indication of the potential of the instructional game and the possible areas of weaknesses. According to Gagne et al (1988 p. 254), the concept of mastery of verbal information must be related to a predetermined sets of facts, generalizations, or ideas, an acceptable number of which a student can state in acceptable form or degree of completeness and accuracy. Assessing the learning of verbal information means measuring quantity (Gagne and Beard, 1978). The intention is to assess how much the student knows about some particular historical event or era, or about a natural phenomenon like earthquakes. Dick and Carey (1985, p. 13) observe that:

> to assess intellectual skills, it is usually necessary to provide three or more opportunities to demonstrate the skill. However, with verbal information, only one item is needed to retrieve the specific information from memory. If the information objective covers a wide range of knowledge, for example, identify state capitals, then the designer must select a random sample of the instances, and assume that the

student performance represents the proportion of the verbal information objective that has been mastered.

The embedded tests.

REVISION FUN GAME was the medium to which the Game-plus-Teacher group was exposed and expected to learn from. The REVISION FUN QUIZZES were in the form of verbal knowledge which was to be learned using the REVISION FUN GAME. The quizzes make up 976 test-like questions with answers attached to them. The questions were taken from the verbal type knowledge of the GHC course for class six and, when used in the game, were expected to sensitize the students to most of the subtopics relating to verbal knowledge of the subject. During the instructional period (approximately two weeks) students continued to attend the regular classes and continued to be offered normal class teaching in the subject. The REVISION FUN QUIZZES were used during the instructional process as if they were embedded tests. Embedded tests consist of a single item that tests a single objective, or may be a test consisting of a large number of items for a large number of objectives. Items are included as part of the instructional strategy, and may appear every few pages, or after a major sequence of instruction (Gagne et al, 1988; Dick and Carey, 1985). In this case, however, the embedded test items constituted the instructional content to be learned during the game play while the normal teaching process continued during the scheduled class time. There was, however, no coordination between

the classroom teaching and the game play, except that the two strategies were expected to influence the learner simultaneously.

The Instructional game process.

Some description of the sequence of play may help to highlight fundamental instructional advantages in the REVISION FUN GAME. After having the question asked, the player gives an answer in less than fifteen seconds, after which the challenger (the player asking the question) reads the correct answer on the card if the response is incorrect. It is a requirement that the players read or speak clearly and loud enough to be properly heard by all in the group. The process of play is expected to be a lively interaction and some level of noise is tolerable as it is expected that all the students are fully engrossed in the play in small groups of up to five individuals. The cards are returned into the box one behind the other so that the card at the far back gradually moves to the front; thus, making it possible for questions to be repeated several times over the playing session. Repetition provides a chance for overlearning and it is to provide for this strategy that the game approach was used.

The posttest.

At the end of ten hours of game sessions spread over two weeks, a posttest was administered to the two groups: the group that played the game and the one that did not. The posttest items were the same as those used during the pretest with the exception that

the ordering of items was changed to avoid the influence of the pretest on the performance in the posttest. The condition of post-testing duplicated that of the pretest conditions in almost all other ways.

The purpose of the posttest was to determine

a. the items that are unsuitable for testing the performance on the verbal knowledge as determined by the index of difficulty and estimate of discrimination.

b. whether by playing the instructional game, participants had any advantage over those who did not play.

c. What portions of the instructional game design would require modifications before it can be released for use in schools.

Analysis and interpretation of data obtained from the pretest and posttest would be analyzed in chapter four.

The attitude questionnaire.

The Game-plus-Teacher group of students completed a questionnaire whose purpose was to find out their opinions about the REVISION FUN GAME. The questionnaire contained ten statements which ranged from their feelings about the content to their attitude towards the game itself (See Appendix B). The answers were given without revealing their identity, thus ensuring that they could answer without the fear of a reprimand resulting from their expressed opinion. However, the designer confirmed that pupils who participated in the game playing filled the questionnaire by administering the questionnaire at the same

seating following the posttest. The student responses to the questionnaire are analyzed in chapter four.

CHAPTER FOUR

Analysis of Data and Results

Data Analysis

Introduction

The data analyzed in this study fall into three categories: 1. data collected during the one-to-one and the small-group stage. These data were used to revise the instructional game and content before the field trial. They will not, therefore, be featured at this stage; 2. data obtained from the pre- and posttests from the two groups used in this study. The purpose of obtaining the data was to determine whether the instructional game process, including the teacher activities during teaching in the classroom, combined to produce significant improvement in performance in verbal knowledge in Geography, History, and Civics: A combined course than did the group that was not exposed to the gaming method; 3. the attitudinal data which were obtained from the Game-plus-Teacher group to determine the learners' attitudes toward the game and the subject after they had experienced the instructional game strategy. The designer reaction to this analysis is reported below.

Attitudinal Data

The responses to the attitude questionnaire (See Appendix B) are summarised below. Students were required to respond to ten items three of which had multiple requirements (See Table 2). The pattern of the responses was as follows:

Item 1: "Were the quizzes clear to you?". 41 students responded to this question. 35 of the responses representing 85% were in the affirmative; while 6 responses, or 15% were in the negative.

Item 2: "Do you feel you now know more GHC facts than you did before you played the game?". To this question, 98% of the responses were in the affirmative while only 2% were in the negative.

Item 3: "Did the game make it easier for you to understand GHC facts than before?" 98%, were in the affirmative.

Item 4: "Did you enjoy learning GHC through playing the game?" All the responses were in the affirmative.

Item 5: "Do you like GHC after playing the game more than you did before?" This question attracted 100% responses all in the affirmative.

Item 6: "What helped you more quickly to learn to play the game?". Students were expected to select one out of three responses given. 21 students chose "The explanations from the teacher" representing 51%; 14 students or 34% of the respondents chose "By reading the Playing Guide"; 4 students chose "Through playing with my friends". Two students made more than one choice, thus nullifying their selection.

Item 7: "Did you find the Playing Guide useful to help you play the game better?". 36 responses were in the affirmative representing 88% of the total responses. The rest were in the negative.

Item 8: "Would you like to play the game often?" elicited 100% positive responses.

Item 9: "Which one would you prefer?" This question provided three possible responses out of which only one selection was to be made. "Learning GHC using the game alone" was selected by 17% of the students; "Learning GHC with the teacher alone" attracted 24 % of the responses; and, "Learning GHC with both the game and the teacher" received 20 responses accounting for 49% of the responses. Two students ticked more than one alternative, while two did not respond at all.

Item 10: " What is the best thing you like about the REVISION FUN GAME?" The question required a response to one of the four alternatives. "The game is very enjoyable" received attention from 27 students representing 66% of the students; "The game is not serious" was selected by three students; "It is easier to understand facts when you play" received eight responses, or 20% of the total; and, "In playing the game pupils work in groups" was selected by only one student. Two students selected more than one answer (See Table 2).

TABLE 2. SUMMARY OF ATTITUDINAL DATA

Item	% Affirmativ	% Negative	% None
	85	15	0
2.	98	2	0
3.	98	2	0
4.	100	0	0
5.	100	0	0
6. a.	51	N/A	N/A
b.	34	N/A	N/A
c.	4	N/A	N/A
7.	88	12	0
8.	100	0	0
9. a.	17	N/A	N/A
b.	24	N/A	N/A
c.	49	N/A	N/A
10 a.	66	N/A	N/A
b.	7	N/A	N/A
c.	20	N/A	N/A
d.	5	N/A	N/A
Other	5	N/A	N/A

The attitudinal data analysis thus definitely seems to favour the instructional game strategy. Students considered the game to be better in almost all ways. Where they did not, they considered the need to have both the game and the teacher method used. The response to item 3 is particularly significant. An overwhelming number of students considered the game to be a simpler and more enjoyable way of learning verbal knowledge. The finding is supported by Boocock and Schild (1978), Campbell (1978), and Greenblat (1975). Abt (1971) also supports the conclusion when he states that games communicate very efficiently the concepts and facts of many subjects. Heinich et al (1986) also arrive at a similar conclusion when they state that games are particularly well suited to attainment of cognitive objectives, especially

those involving recognition, discrimination, or drill and practice.

The students indicated total agreement regarding their attitude toward the GHC subject when they stated that they all liked the subject more than they did before they played the game. Cordtz (1969) had come to a similar observation when he stated that learners who played the game expressed higher interest in the course and content. According to Campbell (1978), learners must demonstrate that they have changed both in attitude on the subject matter and also on the game itself if interpretation of effectiveness of the instructional game is to be made. In this case, students' attitudes towards the game are demonstrated in their responses to items 3, 4, 5, 8, 9, and 10. All the responses point to a slant in favour of the game strategy. In item 3, 98% thought the game made learning facts easier; they indicated that they would learn facts better using the game in item 4; and in item 5, the students' attitude toward the subject improved. Students indicated overwhelmingly that they favoured playing the game often in item 8; while in item 9, learning GHC with a combination of the teacher and the game was favoured by about half the number of students. In item 10, once more the learners exhibited their love for fun even when they are learning. Abt (1971) labours on this point vigorously, supported by Heinich et al (1986).

Test Item Difficulty, Discrimination and Reliability

The data obtained from posttest were analyzed to make estimates of index of difficulty and index of discrimination of test items (See Table 3) . A number of students dropped out of the study because they did not sit for the posttest. The missing posttest scores were appropriately omitted from the analysis, thus reducing the number of subjects in each group to 41. Computation of the index of difficult followed Gronlund's formular which he describes thus:

> Estimate the index of difficulty by determining the percentage of students who got the item right...base this estimate on only those students included in the item-analysis groups. Thus, sum the total number in the upper and lower groups...;sum the number selecting the correct answer...; divide the first sum into the second and multiply by 100...Note that since difficulty refers to the percentage getting the item right, the smaller the percentage figure the more difficult the item (Gronlund, 1968, p. 87).

The estimate of item difficulty was based on the upper 14 category scores and the lower 14 category scores each representing a third of the students who were taught using Game-plus-Teacher method.

The data obtained revealed that 55% of the test items had an estimated index of difficulty of 50% or lower, while the rest had

an index of difficulty of above 50%. The index of discrimination was computed following Gronlund's technique as follows:

> ...subtract the number in the lower group who got the item right from the number in the upper group who got the item right and divide by the number in each group...Maximum discriminating power is indicated by an index of 100 (Gronlund, 1968, p. 87).

Computation of the index of discrimination of the test items revealed that 14% of the items had a discrimination of .10 or lower, 65% had discrimination of .40 or above. The 14% items with poor index of discrimination were removed from further use in the analysis of these data. The items obtaining between .10 and .39 index of discrimination were identified as needing revision to improve their discrimination before they are used in future tests and in the REVISION FUN QUIZZES.

Table 3. ANALYSIS FOR INDEX OF DIFFICULTY AND DISCRIMINATION

Item No.	Upper Group	Lower Group	Index of Difficulty	Index of Discrimination
1.	13	10	82	.13
2.	14	4	64	.56
3.	14	10	86	.41
4.	3	0	11	1.00
5.	4	0	14	1.00
6.	13	5	64	.44
7.	14	0	50	1.00
8.	0	0	0	.00*
9.	2	2	14	.00*
10.	11	1	43	.83
11.	14	7	75	.33
12.	6	2	29	.50
13.	8	0	29	1.00
14.	14	3	61	.64
15.	12	2	50	.83
16.	9	0	32	1.00
17.	0	0	0	.00*
18.	6	3	32	.33
19.	6	2	29	.50
20.	9	1	36	.80
21.	8	3	39	.45
22.	8	2	36	.60
23.	12	8	71	.20
24.	3	0	11	1.00
25.	3	3	21	.00*
26.	11	6	61	.29
27.	10	8	64	.11
28.	11	1	43	.91
29.	12	8	71	.20
30.	12	5	61	.37
31.	12	7	68	.26
32.	11	1	43	.91
33.	9	2	39	.64
34.	6	2	29	.50
35.	10	0	36	1.00
36.	5	5	36	.00*
37.	4	1	18	.60
38.	11	1	43	.91
39.	13	6	68	.37
40.	12	13	89	-.04*
41.	13	5	64	.39
42.	13	11	86	.08*
43.	13	13	93	.00*
44.	14	9	82	.22
45.	13	5	64	.39
46.	1	0	4	1.00
47.	3	0	11	1.00
48.	3	0	11	1.00

* Items excluded from analysis.

49.	7	0	25	1.00
50.	6	0	21	1.00
51.	12	2	50	.71
52.	13	4	61	.53
53.	13	0	46	1.00
54.	9	5	50	.29
55.	9	0	32	1.00
56.	2	3	18	-.20*
57.	12	4	57	.50
58.	13	4	61	.53
59.	11	2	46	.69
60.	11	1	43	.91
61.	7	1	29	.75
62.	8	0	29	1.00
63.	11	4	54	.47
64.	6	0	21	1.00
65.	13	4	61	.53
66.	14	7	75	.33
67.	10	2	43	.67
68.	14	6	71	.40
69.	7	0	25	1.00
70.	5	1	21	.67
71.	8	1	32	.78
72.	11	2	46	.69
73.	3	0	11	1.00
74.	10	2	43	.67
75.	12	7	68	.26
76.	13	2	1	.73
77.	13	8	5	.24
78.	13	2	54	.73
79.	12	11	82	.04*
80.	14	2	57	.75
81.	8	7	54	.07*
82.	1	1	7	.00*
83.	1	2	11	-.50*
84.	13	5	64	.44
85.	11	6	61	.29
86.	11	2	46	.69
87.	12	5	61	.41
88.	11	5	57	.38
89.	13	13	91	.00*
90.	8	2	36	.60
91.	10	2	43	.67
92.	9	1	63	.80
93.	12	3	54	.60
94.	3	1	14	.5
95.	13	7	71	.30
96.	13	5	64	.44
97.	11	6	61	.29
98.	11	2	46	.69
99.	13	7	71	.30
100.	3	1	14	.50

Computation of reliability coefficient of the test items was also done. The estimate of reliability was computed using the Kuder-Richardson Formula 21 represented thus:

$$(KR21)=\frac{1-M(K-M)}{Ks^2}$$

A coefficient of .96 was obtained indicating a high reliability of the test used in this study (Gronlund, 1968, p. 87).

Results of Pretest and Posttest Comparisons

The pretest and posttest data were analyzed by means of the SPSSx Computer software at Concordia University. A T-test for independent sample means method was used. The means and standard deviations of the two groups of learners in this study, separately by pre and posttests, are presented in Tables 4 and 5.

Comparison of the two groups on the pretest data revealed that there was no significant difference between the two groups of students on recall and recognition of verbal information in GHC at the start of this study ($T = -.53$, $df = 80$, $p.>.001$; See Table 4). Comparison of the two groups of participants on the posttest, however, revealed that there was a significant difference in the performance on recall and recognition of verbal knowledge between the two groups ($T = 5.44$, $df = 80$, $p.<.001$; See Table 5)

TABLE 4. PRETEST DATA SUMMARY

METHOD	MEANS	SD	T-VALUE	DF	TWO-TAIL PROB.
GAME-PLUS-TEACHER	11.61	8.84	-.53	80	.596
TEACHER-ONLY	12.63	8.58			

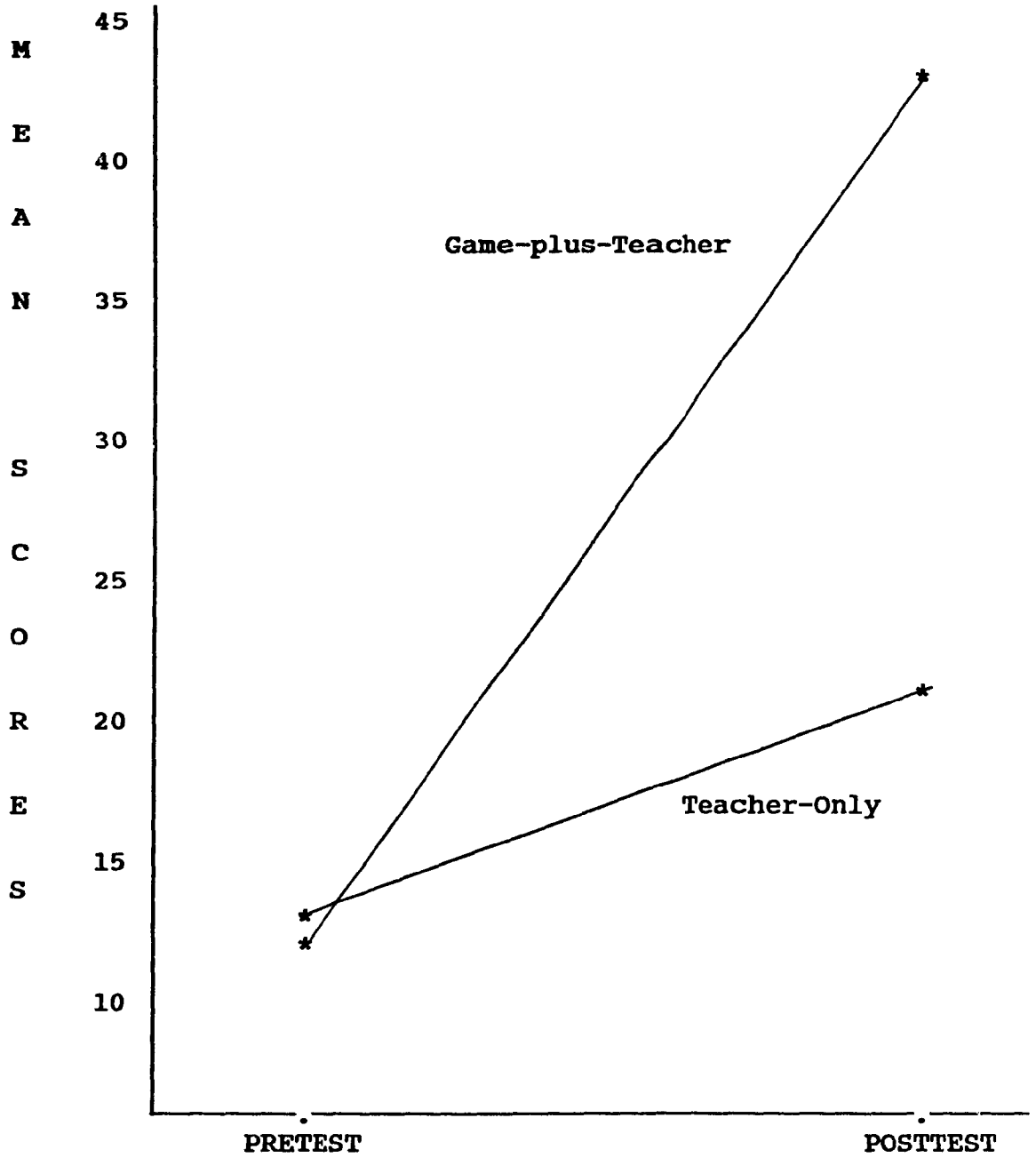
TABLE 5. POSTTEST DATA SUMMARY

METHOD	MEANS	SD	T-VALUE	DF	TWO-TAIL PROB.
GAME-PLUS-TEACHER	43.29	22.68	5.44	80	.000
TEACHER-ONLY	21.44	12.09			

Examination of the means for the two groups shows that the Game-plus-Teacher group demonstrated significantly greater improvement than in the Teacher-Only group by a substantial margin (Mean difference = 21.85; see fig. 8).

It is necessary to note that although the level initially set for mastery of verbal knowledge in GHC subject was 60%, only about one third of the students reached, or went beyond, that level. When comparing this performance with that of the Teacher-Only group, it was found that no student in this group reached, or even came close to, the mastery level of the content tested, a further indication of widening differences in the two groups on

FIG. 8 PRETEST - POSTTEST SCORES MEANS



account of the different treatments. This, nevertheless, does point to the need to find out the causes for lack of achieving mastery as projected. The designer's decisions following this observation are reported in the "Discussion" section of the concluding chapter of this thesis.

CHAPTER FIVE

Discussion and Suggestions for Revising and Improving the Instructional Game

Introduction

With the foregoing findings in view, one could ask, "would the learners have improved in their ability to recall and recognize verbal information in GHC without the game?". All we have tried to show is that given the existing teaching styles as observed from the performance of the Teacher-Only group which represents the approach commonly used in our schools, learners do not appear to exploit their full potential in learning. One of the reasons for this is that learners do not exercise significant control over their learning habits. The teacher almost exclusively determines what and how the students learn. Most of the teachers choose the traditional talk and chalk approach which in the long run acts to discourage those learners that are not fortunate enough to understand the first time knowledge is presented to them in class. How many learners have hated math merely because the teacher who taught them the first time missed out some rudimentary skills in math computations, thus making learning math seem like some mental harassment? In most cases, all the learner required was some preparation for the type of skills math represents and he would have built his/her confidence from successes in the earliest and simplest computations. As can be observed, what the teacher chooses for the learner is often short of the learner's capacity to absorb. To answer the question posed

at the beginning of this discussion, it is possible to improve the learner's ability to recall and recognize verbal information, in addition to other types of skills. The teacher should nevertheless apply a mixture of techniques effectively for this to happen. As has been demonstrated here, the instructional game can be effective in terms of motivation, independence of control, and efficiency in teaching verbal information. Failure to achieve the mastery level set, however, could also lead one to conclude that some aspects of the instructional game should be improved if it is to become more effective. In this last part of this study some of the aspects that should be improved, or introduced will be highlighted.

Classroom Application of REVISION FUN GAME

It has been observed that the game is only one of the strategies in the teacher's repertoire of teaching methods that should be considered for use in the classroom. In many ways the game could make an effective method of teaching the background knowledge of a subject. A learner who is familiar with the subject terminology, names, certain facts, and generally proficient in the language of a subject is easier to communicate with than a student who has no familiarity with such knowledge. Exposure to knowledge before hand could provide a headstart in learning. The instructional game is a convenient and effective motivator, and has also proved to be effective in improving performance in learning. The student would enjoy playing the game

and the practice effect provided by the game would increase the possibility of recognizing the knowledge whenever the learner encounters it. This could facilitate student teaching, and make it easier for them to be quickly initiated into learning the content during the regular class sessions. This type of student would be different from the one who relies entirely on the teacher to introduce him/her to the subject matter in the classroom, to determine how much he/she can learn at any time, and to make him/her content with the sometimes inadequate overview the teacher may give to some aspects of knowledge, given the limiting time factor.

The gaming process requires constant revision. In order to improve the effect of the instructional game, it should be integrated into the classroom activities. One can visualize a situation where the learner is exposed first to the game, and then regularly to the game-playing routine. The teacher organizes his teaching around the materials learned in the game, constantly provoking the learner to recall some of the facts already contained in the quizzes. It is this linkage that would diminish the amount of time the learner might take to learn the new levels of content. It should also be possible for the teacher to avoid dwelling on the verbal knowledge too long. This has already been pointed out to be a familiar problem in many schools where verbal knowledge sometimes become the substitute for the entire subject content (Orlich, 1985).

Improving the Instructional Game Process

In order to improve the classroom integration of the game evaluated, the designer would include a teachers' guidebook for the use of the game in the classroom that would provide a standard approach to this method. The guidebook would also provide instructions regarding how the teacher could make use of the gaming strategy to maximize results. A suggested design for such a guidebook is included in Appendix D.

It has already been suggested that Kenyan primary schools provide some time for gaming. Out of 40 periods provided in the timetable, 29 are occupied by the regular lessons. It is possible then to identify a double period session when the game can be played. This can be easily squeezed between the 3.10 to 4.20pm time slot in the timetable, reduce the GHC periods to three instead of the current four, and then, have the class play the game once a week. Learning of content through quizzes would no doubt be a speedy affair. It is only a matter of time before the learners achieve automatization in the content availed to them through the game. This stage is reached when learners can recall or recognize all the information contained in the quizzes and are unlikely to forget. Achieving automatization provides an added challenge to teachers to keep modifying the quizzes to provide a fresh approach to content after every few months. The need to involve the teacher fully in the development of the gaming strategy becomes important as this would ensure constant revision and modification. Teachers should be encouraged to

develop their own quizzes that would enrich REVISION FUN QUIZZES developed here.

Further Evaluations

So far, the instructional game has been evaluated for the purpose of producing an effective learning package. Essentially, the procedures followed in this stage of evaluation exclude the many different situations in which the game could be used. During the field trial, the schools used for the testing processes were only representative of a specific type, namely the urban type of school. The schools may differ in several ways from their rural and suburban counterparts, and even within the urban areas, per se. Differences of locality and the communities served could affect the effectiveness of any learning process. It would consequently be incorrect to assume that the findings reported here are representative of all the possible situations found in Kenya.

REVISION FUN GAME can be used in schools since there is proof that it can be quite effective with students. It is, however, recommended that further studies at a summative level be carried out not only to determine whether it is effective in different school conditions, but also how effective it is in comparison with other types of approaches. Of special interest is the teaching of different levels of skills starting with verbal knowledge. If teachers can establish the best approaches to different levels of skills, then learning can be made both

economical and enjoyable. Which other techniques can make similar claims as the REVISION FUN GAME to teach verbal knowledge in GHC? Is REVISION FUN GAME as effective in teaching verbal knowledge in other subjects as well, or even better? Is the REVISION FUN GAME effective in teaching other levels of skills? When is the REVISION FUN GAME more effective, before any instruction in the subject starts, during the instructional process, or after the instruction? What effect does the use of REVISION FUN GAME have on the performance in the national examinations? What other effects does the game have on learners? These and other questions are of interest to the teacher, and can make challenging hypotheses for advanced studies.

REFERENCES

Abt, C. C. (1970). Serious games. New York: Viking Press.

Allen, L. E., Allen, R. W., and Miller, J. C. (1966). Programmed games and the learning of problem solving skills: the WIFF 'N PROOF example. The Journal of Educational Research, 55, 22-25.

Baker, E. H. (1966). A comparative study of textbook and simulation approaches in teaching junior high school American history. Unpublished doctoral dissertation. John Hopkins University.

Bloom, B. S., Madaus, G. F. & Hastings, J. T. (1981). Evaluation to improve learning. New York: McGraw-Hill Book Company.

Bloomer, J. (1974). Prospects for simulation and gaming in mathematics and science education. Programmed Learning and Educational Technology, 174-182.

Boocock, S. S. and Schild, E. O. (1968). Simulation games in learning. California: Sage.

Bowen, J. J. (1981). The use of a game as an instructional media. Unpublished doctoral dissertation, University of California at Los Angeles.

Campbell, D. T. and Stanley, J. C. (1968). Experimental and quasi-experimental designs for research. Boston: Houghton Mifflin company.

Campbell, N. M. (1978). Formative evaluation of a game for introducing metric measures to adults. Unpublished MA Dissertation.

Coleman, J. S. (1971). The role of modern technology in relation to simulation/games for learning. In S. G. Tickton (Ed.), To improve learning. New York: R. R. Bowker.

Cordtz, W. W. (1969). A simulation methodology of instruction in a college course of American studies, unpublished doctoral dissertation. United States International University.

Cowan, L. G. (1965). Education and nation-building in Africa. New York. Praeger.

De Koven, B. (1971). Kohl avoids odious out of respect for children willingness to play. Simulation/gaming/News, 12.

Dick, W. and Carey, L. (1985). The systematic design of instruction. Glenview, Il.: Scott, Foresman and Company.

Feldt, A. G. and Goodman, F. (1975). Observations on the design of simulations and games. In C. S. Greenblat, (Ed.), Gaming-simulation: Rationale, design, and application. New York: Sage.

Fletcher, J. L. (1971). The effectiveness of simulation games as learning environments: a proposed program of research. Simulation and games, 2, 473-488.

Gagne, R. M. (1985). The conditions of learning and theory of instruction. New York: Holt Rinehart and Winston.

Gagne, R. M., Briggs, L. J., and Wager, W. W. (1988). Principles of instructional design. New York: Holt Rinehart & Winston.

Gagne, R. M. and Beard, J. G. (1978). Assessment of learning outcomes. In R. Glaser (Ed), Advances in instructional psychology, Vol. 1. Hillsdale, NJ: Erlbaum.

Gamson, W. A. (1975). SIMSOC: Establishing social order in simulated society. In C. S. Greenblat (Ed.), Gaming-simulation: Rationale, design, and application. New York: Sage.

Garvey, D. M. and Seiler, W. H. (1966). A study of effectiveness of different methods of teaching international relations to high school students (Final report Cooperative Research Project no. S-270). Emporia: Kansas State Teachers College.

Glazier, R. (1969). How to design educational games: A Game design manual for teachers and curriculum developers. Cambridge, Mass.: Abt Associates.

Greenblat, C. S. and Duke, R. D. (1981). Principles and practices of gaming/simulation. Beverly Hills, Calif.: Sage.

Greenblat, C. S. (1971). Games and simulations in L. C. Deighton (ed). Encyclopedia of Education. New York: Macmillan.

Gronlund, N. E. (1968). Constructing achievement tests. Englewood Cliffs N.J.: Prentice-Hall.

Heinich, R., Molenda, M., and Russell, J.D. (1986). Instructional media and the new technologies. New York: Macmillan Publishing Company.

Higbee, K. L. (1978). Some pseudo-limitations of mnemonics. In M. M. Gruneberg, P. E. Morris, and R. N. Sykes, (Eds.). Practical aspects of memory. New York: Academic Press.

Hill, A. (1969). Educational publishing in Anglophone Africa in R. Jolly (ed). Education in Africa: Research and Action. Nairobi: East African Publishing House.

Kenya Institute of Education, (1988). Primary GHC: A combined course for std 6 pupils book. Nairobi: Kenya Literature Bureau.

Kenya Ministry of Education, Science and Technology, (1986). Primary education syllabus: Upper primary. Nairobi: Jomo Kenyatta Foundation.

Mutahi, W. and Anjili, E. (Jan., 31, 1989). Publisher protests. The (Kenya) Standard, January 31, no. 23230.

Ng'weno, H. (Feb. 3, 1989). The ban on imported books. The Weekly Review (Kenya) February 3.

Ng'weno, H. (Feb. 10, 1989). Criticism all round. The Weekly Review, (Kenya), February, 10. p. 13-14

Orlich, D. C, et al. (1985). Teaching strategies: A guide to better instruction. Lexington, Ma: D. C. Heath and Company.

Pophan, W. J. (1975). Educational evaluation. Englewood Cliffs, NJ.

Prewitt, K. (1971). Education and political values: An East African study. Nairobi: East African Publishing House.

Rosenshine, B. (1983). Teaching functions in instructional programs. The Elementary School Journal, 83, 335-351.

Shiffrin, R. M. and Schneider, W. (1977). Controlled and automatic human information processing: perceptual learning, automatic attending, and a general theory. Psychological Review, 84, 127-190.

Skinner, B. F. (1953). Science and human behavior. New York: Macmillan.

Slavin, R. E. (1988). Educational psychology: theory into practice. Englewood Cliffs, New Jersey.

Stein, J. (Ed.) (1966). The random house dictionary of the English language. New York: Random House.

Tansey, R. J. and Unwin, D. (1969). Simulation and gaming in education. London: Methuen Educational.

Twelker, P. A. (1970). Some reflections on the innovation of simulation and gaming. Paper presented at the conference of the Society for Academic Gaming and Simulation in Education and Training, Reading, England.

APPENDIX A

Pretest and Posttest Items drawn from Revision Fun Quizzes

PRE- AND POST-TEST ITEMS

(Includes Answers)

Your full name.....

Name of School.....Class.....

To-day's date.....

Answer All Questions by Filling the Correct Answer in the Spaces Provided

1. What did Kinjeketile give to his freedom fighters to protect them against all kinds of weapons?.....(Magic water)
2. What do we call a kind of trade involving a straight exchange of one type of goods for another?.....(Barter trade)
3. In which century did long distance trade develop in eastern Africa?.....(19th Century)
4. Who organized revolt against the Egyptians and their administrators in Sudan in 1881?.....(Muhammad Ahmad)
5. What names did the British use to differentiate the people of southern and northern Sudan?.....(Nilotic Sudan & Arab Sudan)
6. What substance is used by farmers to make their crops grow well?.....(Fertilizer)
7. Under what ministry in Kenya are games and lodges?.....(Tourism and wildlife,

8. What name do we give to goods such as fruits and vegetables and flowers which go bad quickly?.....(Perishable goods)

9.Which airport is the main centre for light aircraft in East Africa?.....(Wilson Airport)

10. Which emperor saved Ethiopia from colonization by Europeans?.....(Menelik II)

11. What does Addis-Ababa mean in Amharic?.....(New flower)

12. After the defeat of the Germans in the first world war, who took over the ruling of that country?.....(Britain)

13. After the first world war which country started ruling Rwanda and Burundi?.....(Belgium)

14. What is unrefined oil called?.....(Crude oil)

15. What are petrol, diesel, and kerosine made from?.....(Petroleum or crude oil)

16. During the 1920s and 1930s, which famous cotton growing scheme was started in Sudan?.....(Gezira scheme)

17. Between which two rivers in Sudan is the Gezira scheme?.....(Blue and White Nile)

18. What European nation had colonized what we now call Djibouti?.....(France)

19. Which European nation colonized the northern part of the traditional lands of Somalis?.....(Italy)

20. Who collected taxes during the time of German rule in Tanganyika?.....(Jumbes and Akidas)

21. Who gave the Africans cotton seeds in Tanganyika during the German colonial rule?.....(Germans)

22. Who was appointed to rule for Daudi Chwa because he was too young to rule?.....(Baganda Regents)

23. Which agreement between the British and the Buganda was signed in 1900?.....(Buganda Agreement)

24. In which year was a second unofficial Asian member appointed to the Uganda Legislative Council?.....(1933)

25. After which year were Africans appointed to the Uganda Legislative Council?.....(1945)

26. What name is given to a man married to more than one wife?.....(Polygamist)

27. What name is given to a man married to one wife only?.....(Monogamist)

28. In 1894, which Uganda kingdom was conquered by the British?.....(Bunyoro)

29. What happened to the Ugandan king when his kingdom was conquered by the British in 1894?.....(He fled/ran away)

30. In traditional agricultural societies who did the planting, weeding and harvesting?.....(Women)

31. In most traditional societies who built houses?.....(Men)

32. What name were the protestant missionaries given in Uganda?.....(Baingereza)

33. What name were the French missionaries given in Uganda?.....(Bafaranza)

34. When Dr Apolo Milton Obote became Uganda's president for the second time, who was appointed vice-president?.....(Paulo Muwanga)

35. Which movement did Yoweri Museveni start to free Uganda from the Obote's government?.....(National Resistance Movement)

36. Who collected hut tax during the British rule in Uganda?.....(Chiefs)

37. In which year was a Legislative Council formed in Uganda?..... .....(1921)

38.Which word do we use to mean that members of a family depend on one another in one way or other?.....(interdepend(ent)

39. What Swahili word is usually used in Kenya referring to illegal trade?.....(Magendo)

40.When Kabaka Mwanga became strongly anti-christian and anti-European, what happened to many of the Baganda who had become christians?.....(They were killed)

41. What do we call people who are killed because of their religious beliefs?.....(Martyrs)

42. What is the name of the plant we live on?.....(Earth)

43. Around what planet does the earth revolve?.....(The Sun)

44. As we travel to the west how many minutes do we lose as we cross one degree?.....(4 minutes)

45. In which month in Eastern Africa is the mid-day sun directly overhead the equator?.....(March & September)

46. When was the Preferential Trade Area for eastern and southern African states set up?.....(1981)

47. What do we call the kind of trade where foreign nations are involved as opposed to trade within a country?.....(External or Foreign trade)

48. On what day, month and year was Haille Sellasie deposed and placed under house arrest?.....(12th Sept, 1974)

49. After Haille Sellasie was deposed in whose hands was the Ethiopian Government?.....(Mengitsu Mariam or PMAC)

50. Which groups of people opposed the monarchy in Ethiopia in the 1960s and 1970s?.....(Students/intellectuals)

51. Which natural problem increased anti-government feelings in Tigre and Wollo provinces of Ethiopia from 1974?.....(Drought and Famine)

52. Of all the substances on earth which one is the hardest?.....(Diamond)

53. What do we call the bluish rock found in a pipe?.....(Kimbrelite)

54. Which year was the diamond mine discovered in Tanzania?.....(1940)

55. What was the name of the geologist who discovered the diamond mine in Tanzania?.....(Dr Williamson)

56. Which European nation started railway construction work in Tanzania?.....(Germany)

57. What is Tanzania-Zambia railway called?.....(Tazara)

58. Where is Sudan's coastline?.....(Red Sea)

59. What is the name of the road to connect Mombasa and Lagos?.....(Trans-Africa Highway)

60. Who succeeded Julius Nyerere as the president of Tanzania?.....(Ali Hassan Mwinyi)

61. In 1962, who was the president of Uganda?.....(Kabaka Mutesa II)

62. Who took Yusuf Lule's place as Uganda's head of state?.....(Godfrey Binaisa)

63. In which month and year was Godfrey Binaisa overthrown as Uganda's head of state?.....(May, 1980)

64. Who led Somali resistance to British and Italian colonialism of Somalia?.....(Mohammed Abdille Hassan)

65. What name did the British give to Mohammed Abdille Hassan?
.....(The Mad Mullah)

66. Which two things did the Arabs mainly want from the Kabaka?.....(Slaves and ivory)

67. what valued items did Buganda receive in return for slaves and ivory?.....(Firearms)

68. After 1924, what kind of rule was introduced by the British in Tanganyika?.....(Indirect rule)

69. In which year was the Tanganyika Legislative Council formed?.....(1926)

70. How many traditional chiefdoms made up Mirambo's empire?.....(30)

71. On what were the traditional governments in Somalia based?.....(Clans)

72. What name was given to TAA in 1954?.....(TANU)

73. In which year were elections for the legislative Council in Tanganyika held?.....(1958)

74. Which is the most important part of the cotton crop?.....(The boll)

75. From which part of the cotton crop can oil be extracted?.....(the seed)

76. Who set the Kenya Cooperative Creameries?.....(The settler Dairy Farmers)

77. What do we call a milk processing factory?.....(Creamery)

78. After oil is extracted from the cotton seeds, what are the remaining parts of the crushed seeds used for?.....(Feeding Livestock)

79. After the cotton bolls ripen and burst open, what is the colour of the visible part?.....(White)

80. What are the traditional Baganda kings called?.....(Kabaka)

81. In which country was the first railway line built?.....(Britain)

82. Which bantu community lives to the western side of L. Victoria in Tanzania?.....(Bahaya)

83. Which Bantu community lives to the south-eastern side of L. Tanganyika?.....(Fipa)

84. Which important and unusual feature of natural vegetation is found in Ethiopia?.....(Coffee)

85. In which side of Africa are the Bantu believed to have originated?.....(Western Africa)

86.Which religion did the Portuguese want for eastern Africa?.....(Christianity)

87. The European powers sometimes sent companies to rule their colonies on their behalf. What kind of rule was this?.....(Indirect rule)

88. In which country was Mt. Cool Malasin?

89. What is the name of Kenya's highest mountain?.....(Mt. Kenya)

90. How high in meters does the coastal plain rise?.....(200m.)

91. What do we call a large area of high but fairly level land?.....(Plateau)

92. Into what does river Rufiji flow?.....(Indian Ocean)

93. What do we the whole of space and everything in it?.....(Universe)

94. What mainly determines the kind of vegetation which can grow in a given area?.....(Rainfall)

95. Which European power colonized Sudan, Uganda, Kenya and Zanzibar?.....(Britain)

96. Which was the former name of Tanzania?.....(Tanganyika)

97. How many degrees south is the south pole?.....(90 degrees S)

98. At what height in metres above sea level is Nairobi?.....(1675m)

99. What do we call vegetation which grows without man's help?.....(Natural vegetation)

100. Who led the Maji Maji uprising?.....(Kinjeketile Ngwale)

APPENDIX B

ATTITUDE QUESTIONNAIRE

ATTITUDE QUESTIONNAIRE

Please answer the following questions to help us understand what you think about the REVISION FUN GAME. You can answer by ticking the answer you feel is the best for you. Your answers will help us make the game better. Note that we only want your honest answers, not your name.

1. Were the quizzes clear to you? Yes____No____.

2. Do you feel you now know more GHC than you did before you played the game? Yes____No____.

3. Did the game make it easier for you to understand GHC facts than before? Yes____No____.

4. Did you enjoy learning GHC through playing the game? Yes____No____.

5. Do you like GHC after playing the game more than you did before? Yes____No____.

6. What helped you more to learn to play the game quickly? (tick one)

The explanations from the teacher____.

By reading the Playing Guide____.

Through playing with my friends____.

7. Did you find the Playing Guide useful in helping you to play the game better? Yes____No____.

8. Would you like to play the game often in the class?

Yes____No____.

9. Which one would you prefer: (tick one)

Learning GHC using the game alone____.

Learning GHC with the teacher alone____.

Learning GHC with both game and teacher____.

10. What is the best thing you like with the REVISION FUN GAME? (tick one)

The game is very enjoyable____.

The game is not serious____.

It is easier to understand facts when you play____.

In playing the game pupils enjoy working in groups____.

Thank you for giving us your opinion. We shall make use of it when making the game better.

APPENDIX D

Gitumbi's REVISION FUN GAME: TEACHERS' GUIDE TO THE USE OF THE GAME FOR TEACHING

Gitumbi's REVISION FUN GAME

TEACHERS' GUIDE TO THE USE OF THE GAME

FOR TEACHING

Prepared for Classroom Instructional Use

by W. G. Kinyanjui B.Ed. Dip. Lib. M.A.(E.T)

TABLE OF CONTENTS

Gitumbi's REVISION FUN GAME

TEACHERS' GUIDE TO THE CLASSROOM USE

INTRODUCTION

This Guidebook was prepared for use in the schools where the REVISION FUN GAME is adopted as a teaching strategy in the classroom. It is intended to guide the teacher to make maximum use of the REVISION FUN GAME for teaching their subjects.

Gitumbi's REVISION FUN GAME is more than just a game. Usually, a "game" is not regarded as something serious. Some people have been heard to say, "This is only a game!" implying that its purpose is to create enjoyment, and probably nothing else. If you pause to think about it though, what is your personal impression of teachers who create fun in the class when teaching? It is generally considered that such teachers build great interest in the subject they teach, and pupils are likely to remain awake and intellectually active throughout during the session. In this case, although the game is packed with interesting and enjoyable experiences, it is nevertheless serious enough to make learning possible. The REVISION FUN GAME has been tested in the schools with pupils. These tests revealed that the game, if properly used, is highly appreciated by learners and quite capable of increasing their performance considerably.

The game was designed in the wake of the introduction of 8-4-4 system of education. Many teachers find that the syllabus is too crowded to be effectively covered within the one year in each class. Yet the final examinations assume that the pupil has covered each and every topic in the syllabus adequately. Teachers will agree with us that this is not always the case. Sometimes the teacher will tend to overfeed the pupil with too much knowledge in order to cover the syllabus. Consequently he neglects the teaching of higher skills in the subject. The pupil is highly at a disadvantage because of this assumption. Here is an opportunity to shift the load so that the learner and the teacher can share in the experience toward achievement of the objectives through the use of the REVISION FUN GAME.

It is our belief that every child has the capability of doing well in school unless the child has some peculiar handicaps. If the consideration of the children's differences is taken into account, and the most effective methods are used in teaching, every child should be able to perform reasonably well. Our belief is supported by performances in some schools which manage to pass all their candidates in the national examinations. Does it mean every child in the school is a genius? No, not at all. They have discovered the value of involving the pupil in determining his learning experiences, which explains the consistency with which the children do well time and again.

The term "REVISION" is a little confusing in view of the sense it is normally used. This game can be played before the start of teaching the particular subject, at the same time as the teaching of the subject, or as a revision tool. The use of the game before or during the teaching time is mostly recommended. Whichever time you choose to use it, however, pupils are bound to find the experience very rewarding.

II. SOME TEACHING PRINCIPLES CONSIDERED

Gitumbi's REVISION FUN GAME uses some very well known principles of teaching and learning. Here are a few of them.

1. The Motivating Factor.

Pupils learn better when they like what they are taught. And pupils like those activities that are enjoyable or interesting to do. Children are known to like playing games. In fact playing is one of the children's number one favourite. The game provides the environment for play but it also provides the environment to learn. The teacher should cultivate ways that help to make learning interesting all the time to the learners.

2. The Practice Factor.

There is the old saying that practice makes perfect. It is well known that much knowledge is learned through practice. Repeating things over and over again makes them stick in our memories because of the practice effect. The game provides an opportunity to keep meeting the same words, facts, names, dates, etc., over and over again as the pupils play. This increases their rate of recall and recognition of the things so practiced; in other words, pupils come to the point where they are completely

familiar with all the new knowledge contained in the REVISION FUN QUIZZES. When knowledge is learned to this extent, it becomes part of the pupils knowledge which he can use at will. This frees the pupils mind so he can learn new knowledge.

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3. The Basic or Verbal Knowledge.

Every subject has its own knowledge which forms the basis of its existence. This knowledge is made of a specific vocabulary that is special to that subject. This is the verbal knowledge or information of the subject. To claim to know the subject is to be able to recall or recognize the vocabulary, facts, names, etc., of the subject. It is important that pupils should have enough opportunity to learn this knowledge because it is vital if they are going to know anything else about the subject.

It is not easy to learn this knowledge. Most of it requires much time to memorize through drills and repetition. It takes time to do this. Some of the verbal knowledge is considered dull and pupils find it dreary and uninteresting. With the crowding of the subjects to be covered in any one class in one year, teachers cannot afford the time to make sure that the verbal knowledge for each subject is adequately learned. But in deed they should.

The game provides the chance to have some of the responsibility of learning verbal knowledge transferred to the pupil without the teacher's direct involvement. Through the game all pupils learn the verbal knowledge represented by REVISION FUN QUIZZES sometimes not even knowing that they are learning. Pupils find themselves suddenly conversant with a large body of knowledge, and are also able to follow the class lessons easily. After all they now understand the vocabulary the teacher uses in class. This is normally the case. Pupils are often confronted with terms, names, facts which they can hardly pronounce when the teacher uses them the first time in the class. Many children give up early since they consider themselves incapable of learning the subject content. They are likely to continue to have problems with the subject because they failed to get their confidence right the first time.

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4. Comprehension and Application of Knowledge

Verbal knowledge only prepares the pupil to learn the subject. It is only the beginning of learning the subject. By using the game to learn the verbal knowledge the teacher is freed to concentrate on teaching the higher levels of knowledge in the subject. Pupils must show that they have understood the knowledge by being able to compare and contrast; learn how to apply the knowledge by being able to describe situations where that knowledge is applied, and so on. Many methods can be used to teach these

procedures and it is the teacher's responsibility to find out the most effective method. The game helps to take care of the verbal knowledge so that the teacher can have enough time to concentrate on these other levels of teaching.

Some teachers tend to take too much of the time teaching verbal knowledge at the expense of higher order knowledge. You can see that they are preventing pupils from learning some vital parts of the subject matter. Pupils should be able to show evidence of comprehension of the subject and this is what the teacher should concentrate on. Learning of verbal knowledge using the game will make it easier for the teacher to achieve the higher level objectives with the pupils. Teaching of higher order skills should be done by teacher using the techniques at his disposal. Some information regarding varieties of available aids for teaching these can be obtained from the developers of this game.

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5. Getting Feedback

Immediate knowledge of results is one of the most important principles of learning. Pupils should be able to know how they are doing very soon after they are tested. Their learning will depend much on how quickly they can correct their mistakes. REVISION FUN GAME provides constant and instant feedback. The pupil is immediately made aware of the mistake he makes and an immediate correction too. This speeds up the process of learning.

6. Group Influence

While it is true that pupils may find some of their teachers intimidating, they are generally comfortable with their fellow pupils. They can make mistakes in the presence of their peers without the feeling of calamity. They are therefore free and more expressive in the company of their peers. The use of groups during the game play means pupils can make mistakes freely, correct each other freely, and generally learn in a less tense atmosphere.

Later, when the pupils are in class with the teacher, they are more confident as they realize that what the teacher seems to be saying is familiar to them. Which boosts the pupil's confidence and ensures better performance in the subject.

Many other principles of learning and teaching can be stated in support of the game use in the classroom. Suffice it to say that unless the arrangement for the use of the game is done properly, expected results could be affected.

III. PREPARING THE CLASS TO PLAY REVISION FUN GAME

Getting your class organized so that the REVISION FUN GAME is made part of the overall teaching plan is important at the earliest stage. So plan for this well so that you will find it as a helpful tool and not as a problem.

1. The Time-table

We recommend that you use one double period each week for the game unless circumstances completely prohibit it. You can plan so that the game period falls as the last game in the afternoon, say, between 3.20pm and 4.30pm. This time many pupils are usually tired and looking forward to going home. They need something refreshing to keep them awake during this time. What better method than the game to wake them up! It is possible to devote one of the periods allocated to the subject to the game session plus one other free period, making a double period of 70 minutes of the game play per week, and reducing the total number of periods for subject by one. Considering that pupils will learn the basic knowledge of the subject using the game, this is an efficient way of making use of the time.

2. The Game Playing and the Other Lessons.

The strategy for teaching the subject needs to be integrated so that there is a relationship between the different techniques of teaching. It should be possible to relate what the teacher teaches in the classroom with the activities in the game sessions.

For instance, the teacher should teach pupils the pronunciation of the difficult words which the teacher supposes are likely to cause problems during the game. In GHC for instance, foreign and tribal names, geographical features and historical periods could become a problem when learners first use them during the game. A short period of time used at the start of the programme to teach pronunciation of these words would speed up the rate of learning the basic terms and facts.

Equally important is constant reference to some features found in the game during the teaching of higher order knowledge. This makes the learners to relate what they learn in the game and the classroom teaching by the teacher. Short weekly tests probably drawn randomly from the REVISION FUN QUIZZES, or set to reflect both class work with the teacher and the game play could increase the rate of performance by pupils, and give indication of the mastery of content..

The teacher should nevertheless use most of the classroom time teaching comprehension and application of knowledge rather than verbal knowledge. The REVISION FUN GAME would already have helped pupils to learn verbal knowledge and what pupils need from the teacher is how to apply that knowledge in different situations.

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3. The Cost Factor.

Perhaps one of the most important questions that come to mind is, how much? and, can we afford it? The impression anyone would get at first is that the game might be an expensive alternative and money is usually hard coming. If the school is going to adopt the game for classroom use, it is necessary to weigh the benefits of the game against the real shilling value of the instruments. To do this it is necessary to assess the cost of the face value of the game package against the number of learners who will be using each set.

When the game is played in a single stream school, the cost per pupil means dividing the total cost of the game and one subject by five. Single stream schools are rare in Kenya today so we can take an average of two streams. In the case of a two stream schools, the cost per child per game is arrived at by dividing the cost of the game by ten. At the present pricing per set, the cost comes to around Kshs.14 per student. When compared to the benefit of teaching the basic knowledge of a subject, the cost

factor is very encouraging, certainly quite low and affordable by almost any school.

The same playing board is required for all subjects. There is, therefore, no need of acquiring a playing board for every subject. The cost per subsequent subject comes to less than five shillings per pupil in a two stream school.

IV. THE GAMING PROCEDURES

1. Getting Started.

This is a groups game. It is therefore necessary to consider the problems associated with getting started.

1. Arrange the seating so that five players can face each other. There should be space in the centre preferably a flat table on which the game instruments can be placed. The moving of desks sometimes causes noise and increases wear and tear. First demonstrate to the class how to move desks without dragging them on the floor. Students should feel responsible towards maintaining their desks in good order as well as keeping the game instruments clean and safe. Pupils should be shown how to conduct themselves before, during and after the playing session.

2. During the first game, the teacher should also make a demonstration of how the game is to be played. Explain the basic moves, how to score, and how to win. Also explain about record keeping to avoid quarrels among the players. It is not necessary to explain all the rules because this would take long and players would get bored. Avoid taking more than ten minutes in the demonstration. Children learn faster by playing, and being corrected on the mistakes they make. After the first session, players will have known nearly everything there is to know about playing the REVISION FUN GAME.

2. The Teacher's Role.

The teacher's role during the first few playing sessions is crucial. He acts as the Chief Steward in the gaming session; the person to resolve disagreements whenever they arise. He should move from group to group and monitor their games without appearing obtrusive. During this time he will overhear mistakes in pronunciation, and observe mistakes in the use of the rules. Errors can be corrected during the regular class sessions. It may also be necessary for the teacher to join one of the groups and participate in playing the game. This will make the pupils feel even more competitive especially if they win over the teacher. You should not feel bad about this. Instead you can make this to be an advantage and encourage the pupils. After all it is only a game! Most important however is the ability of the teacher to notice when the players require variety in procedures, and know when to bring in new motivating expectations.

3. Introducing Rewards.

Introduce rewards for winners whenever possible. As the novelty of the game wears down, maybe after a month or so, the teacher can introduce different types of rewards for the winners. It is suggested that rewards could range from scores or grades as part of the continuous assessment to tangible gifts. If the playing

records are kept for each group for every session, the cumulative scores over the term can be tallied, averaged across the total number of the term's playing sessions and a performance order is established. This can be part of the school report for each child. In the case where more than one class is participating, especially in schools with multiple streams, comparisons can be made within and between the different groups learning through the game in the school. The developers of the REVISION FUN GAMES have developed, and continue to develop, new options to sustain interest in the game. You can write to them whenever you want to increase variety in the rewards and methods of sustaining interest. Their address is to be found at the end of this guide book.

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4. Winding up the Playing Session.

Always make sure that all the game packages are returned safely in the containers. The most effective technique so far is to assign one pupil the duty to collect and distribute the instruments to the group members, and to make sure that every item is returned into the boxes after every game. In addition, the games should be stored safely in a box and kept away until the next session. A checklist of items in each box can be maintained by the student responsible so that he can check every item particularly if another class would be using the same set.

5. Revision Fun Game Playing Guide.

1. Set the playing board on a flat surface such as a table or a clean floor.

2. Place the die (dice) where all players can see.

3. Each player should take one coloured pawn. Each player's pawn should have a different colour.

4. Select the first player. The next turn is for the player to the left, and so on.

5. The current player will do the following:

   (a) Roll the dice on a flat place so that it rolls several times.

   (b) Once the dice stops on a flat surface, check what number is facing up. This should be 1 or 2 or 3. This number tells you: 1. the question number the player has to answer; 2. the number of squares on the PLAYING BOARD he can make a move if he gets the answer correct.

6. The person to the left of the current player reads aloud the question selected. The current player answers within fifteen seconds.

7. The person asking the question checks the correct answer on the card and announces aloud whether the answer is CORRECT! or INCORRECT!.

8. If correct the player moves his pawn TWICE the number shown on the dice. Example: 1 moves two places; 2 moves four places; and, 3 moves six places on the board. All players should start at position 1 on the PLAYING BOARD.

9. When your pawn stops at a position marked "GO TO" you will move to a position up if you get the answer correct; or you will move to the position down if you get the answer incorrect. Otherwise do not move at all.

Example:If your pawn stops at "GO TO 14" and you get correct, then you jump to position 14. If you are not correct when you are in this position, you do not move at all. If you are in the position marked "GO TO 4" you can only do so if you fail to get a correct answer. If you get the answer correct you move the number of places shown on the dice.

10. The winner of the game is the first person whose pawn gets to position number 100 first. After position 93, you move one box at a time.

11. The winner of the session is the player with the highest average score obtained from all the games completed during a single playing session.

The scores are recorded for each player after every game in the score card attached in the following order: No.1 = 10 scores; no.2 = 8 scores; no.3 = 6 scores; no.4 = 4 scores; and, no.5 = 2 scores. Add the number of scores then divide by the number of games played during the session to get the overall position of each player (See the Score Card).

The score for the term can be obtained by adding the average scores obtained per session for each pupil and then divide the sum by the total number of gaming sessions over the term. This score could account for 20% of the term grade in the subject.

12 The game could be made more attractive by introducing some rewards for the overall winners.

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