International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, page no. 228-307

To cite this article: NOLI P. JULOSAN (2025). GAME-BASED LEARNING PRACTICES AS PREDICTOR TO 21stCENTURY SKILLS AMONG SENIOR HIGH SCHOOL SCIENCE STUDENTS, International Journal of Education and Social Science Research (IJESSR) 8 (1): 228-307 Article No. 1029, Sub Id 1196

GAME-BASED LEARNING PRACTICES AS PREDICTOR TO 21stCENTURY SKILLS AMONG SENIOR HIGH SCHOOL SCIENCE STUDENTS

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A Thesis Presented to
The Thesis Committee, Graduate School UM Tagum College Tagum City

In Partial Fulfillment of the Requirements for the Degree
Master of Arts in Education Major in Teaching Science

DOI : https://doi.org/10.37500/IJESSR.2025.8117

ABSTRACT

This study aimed to determine which domain of game-based learning significantly predicts the 21st century skill. The quantitative non- experimental utilizing causal effect was used in the study. The respondents were 196 students in Grade 12 from four secondary public schools of the Municipality of Mawab. Random Sampling technique was employed in choosing the respondents of the study. Mean, Pearson r and Linear Regression Analysis were the statistical tools used in the study. This study revealed a high level of game-based learning practices in terms of goal clarity, feedback, challenge, immersion and social interaction. This also revealed that the level of 21st century skills was high in critical thinking, communication, creativity, and collaboration. The correlation coefficient between two factors of the examination uncovered a high positive huge connection between game-based learning practices and 21st century skills. Challenge and social interaction were revealed as the domain of game-based learning practices that the best predicts the 21st century abilities of the understudies.

KEYWORDS: MAED- Teaching Science, game-based learning practices, 21st century skills among Grade 12 Students, Philippines.

INTRODUCTION

Rationale

The 21st century skills idea roused by the conviction that showing understudies the most significant, helpful, sought after, and multitalented appropriate abilities ought to be organized in the present schools and by the related conviction that numerous schools may not adequately organize such abilities or viably instruct them to students. The fundamental thought is that students, who will grow up in the 21st century, should be shown unexpected abilities in comparison to those educated by understudies in the 20thcentury, and that the skills they learn ought to mirror the particular requests that will put upon them in a perplexing, serious, information based, data age, innovation driven economy and society (Willingham, 2016).

In addition, education leaders must be realistic about which skills are teachable. If teachers deem that such skills as collaboration and self-direction are essential, they should launch a concerted effort to study how they can be taught effectively rather than blithely assume that mandating their teaching will result in students learning them. The plan through 21st century skills proponents seem to be to give students more experiences that will presumably develop these skills for example, having them work in groups. Nevertheless, experience is not the same thing as practice. Experience means only that you use a skill, practice means that you try to improve by noticing what you are doing wrong and formulating strategies to do better. Practice also requires feedback, usually from someone more skilled than you are (Rotherham, 2015).

Game-based learning (GBL) describes an environment where game content and game play enhance knowledge and skills acquisition, and where game activities involve problem solving and challenges that provide players/learners with a sense of achievement. Meanwhile, research has showed that entertainment games are able to promote meaningful learning through providing players with adaptive challenge, curiosity, self-expression, discovery, immediate feedback, clear goals, player control, immersion, collaboration, competition, variable rewards, and low-stakes failure. Given numerous studies support the positive effects of games on learning, a growing number of researchers are committed to developing educational games to promote students' 21st century skill development in schools (Anderson, 2011).

However, the researchers have not come across a study on game-based learning practices towards 21st century skills in the Municipality of Mawab. It only shows that the present study shall make specific contribution and generate new knowledge on game-based learning practices towards 21st century skills in the four secondary public schools in Mawab. The stated scenario persuades the researcher to look for the factors that can lead to the 21st century skills of the students. It is in the context that the researcher is interested to determine whether the game-based learning practices towards 21st century skills of the students as this can raise awareness to the intended beneficiaries of this study and possibly develop action plan to improve learning among senior high school students in Mawab, thus, there is a need to conduct the survey.

Research Objectives

This study determined which domain of game-based learning practices that significantly predicts the 21st century skills among science students in senior high school.

Specifically, the study sought;

1. To describe the level of game-based learning practices among senior high school science students in terms of:

1.1 Goal Clarity;

1.2 Feedback;

1.3 Challenge;

1.4 Immersion; and

1.5 Social Interaction.

2. To describe the level of 21st century skills among senior high school science students in terms of:
2.1 Critical Thinking;
2.2 Communication;
2.3 Creativity; and
2.4 Collaboration.
3. To find out the significant relationship between game-based learning practices and 21st century skills of science students in senior high school.
4. To determine which domain of game-based learning practices that significantly predict the 21stcentury skills.

Hypothesis

The hypotheses were tested at 0.05 level of significance.
1. There is no significant relationship between the level of game-based learning practices and 21st century skills of senior high school science students.
2. There is no domain of game-based learning practices that significantly predict the 21st century skills of senior high school science students.

Review of Related Literature

This part of the study presents the concepts, insights, and ideas from various sources in support to the investigation undertaken by the researcher. The independent variable of this study is game-based learning practices in terms of goal clarity, feedback, challenge, immersion and social interaction (Anderson, 2011) while the dependent variable is 21st century skills in terms of critical thinking, creativity, collaboration, and communication (Binkley, 2014). It introduces the theoretical and conceptual framework for the study that comprises the focus of the research described in this thesis. It also contains the significance of the study, and definition of terms used in the study.

Game-based learning Practices

Gaming and learning can become a perfect marriage. To achieve educational goals, several interactive learning techniques can be used in, or in connection with games. Some examples are learning from mistakes, goal-oriented learning, role-playing and constructivist learning. When playing games, one of the most commonly applied strategies is trial-and-error. Trial-and-error behavior of a learner during playing characterized by the absence of a systematic strategy, although at the same time, it is a primary way to learn and to keep the player motivated. The mentioned learning techniques can be implemented in games, so that the game itself becomes fully integrated in the learning process, instead of remaining an isolated stand-alone resource. In doing so, any generic game can be an educational game if fully integrated in a learning process (Teed, 2014).

Moreover, game-based learning expressed that learning happens when it is social, dynamic and arranged. Likewise, play is helpful for learning. Consequently, these sorts of games can give arranged learning; advance social cooperation, increment inspiration and commitment. Gamers communicate in pretending conditions that permit them to investigate social jobs inside and outside of the game, structure speculations, test new thoughts, and create abilities by messing around. Games-based learning is a typical term with expansive understandings and can incorporate instructive games, edutainment, or diversion games. Game-based learning depicts a domain where game substance and game play upgrade the 21st century aptitudes obtaining, and where game exercises include arranged learning, social cooperation, increment inspiration and commitment that give players or students create on it (Vygotsky, 1978).

Superior advancement of an incorporated model expected to accomplish learning objectives better and completely exploit the force and capability of games in instruction. Game-based learning idea rouses game mechanics application to things that are generally not seen as a game. Truth be told, it helps instructors in convincing or spurring their students to perform and comprehend complex to straightforward points easily in less time. Game based learning has been demonstrated to be amazing in drawing in student's consideration for a more drawn-out range of time. Game based learning isn't just about changing over things in reality into games yet in addition utilizing social cooperation and the qualities of game mechanics and applying them the technique for arranged figuring out how to this present reality (Boyle, 2015).

Furthermore, the examination writing on goal clarity can be separated into three general classifications: content research, which centers around the substance of people's particular objectives e.g., travel, unwinding, basic research, which depicts how objectives are between related e.g., progressively, consecutively, and process inquire about, which looks to describe how objectives impact inspirational, data preparing, and standards of conduct. The present examination, with its accentuation on how objective lucidity and arranging exercises are identified with sparing practices, falls inside the last of these exploration conventions (Austin, 2016).

Moreover, Winnell (2015) argued that an individual’s goals define long-range values that give the person strong direction, a sense of coherence, and meaning. She additionally showed that in a perfect world, objectives ought to be sufficiently clear to give criticism on whether solid targets have been accomplished. This droves her to reason that people with clear life objectives should encounter more prominent degrees of individual viability and life fulfilment. Clear and explicit objectives not just improve working and give a measuring stick against which we measure our accomplishments; however, they likewise give a system to help set up plan, and guide the authorization of intentional conduct (Gollwitzer, 2015).

In addition, clear goals including overall game as well as intermediate goals, autonomy player feel a sense of control over their action in the game takes as its focus the relationship between learning and

the social situation in which it occurs. The viewpoint appeared differently in relation to elective perspectives on learning rather than characterizing learning as the securing of propositional information, Lave and Wenger arranged learning in specific types of social co-support. Instead of soliciting what sorts from intellectual procedures and applied structures are included, they solicit what sorts from social commitment give the correct setting to figuring out how to occur (Lave, 2015).

Feedback is basic for learning as it offers help on the instructive procedure and inspiration and criticism is likewise a significant component of games. A few creators stress the significance of criticism in learning and e games. They express that particular, logical and moment input dependent on objective duty increment the exertion, the presentation and the inspiration of the student. They additionally advocate the utilization of input to help game-based figuring out how to furnish the student with valuable and quick data about his exhibition (Conolly, 2015).

In the definition of Mason and Bruning, feedback characterized as any message created in light of a student's activity, for the most part in the wake of something is finished. It suggests that there is an intuitive stream between the student and the framework, originating from some data gathered or created by the student and returning to him as a yield after some preparing this data stream viewed as a progression of regular information sources and not as one, since it is a piece of the whole learning stream. Through proper criticism, the student can get some data concerning the manner in which he acts and learns. This empowers him to evaluate his own advancement with respect to his objectives and activities, and he can settle on a resulting decision about the following move to make or even about the system to follow (Bruning, 2015).

In any case, there are a few different ways to give criticism dependent on the student's exhibition, the learning history or the learning objectives. Mory portrays two primary kinds of criticism: informational and educational. Informational criticism identified with the information area and educational input identified with the setting where learning happens. While informational criticism inclines toward a remedial intercession on the learning procedure, instructive input centered on self-guideline. Moreover, there are four fundamental kinds of markers in educational input: identified with execution, identified with process, identified with social collaborations and identified with ecological associations (Mory, 2015).

Furthermore, not all authors concede to the beneficial outcomes of feedback. The distinctive discernment that clients have about execution criticism and how clients can be diverted on their methodology attempting to enhance their outcomes consequently, without investigation. What's more, instructive e-games and recreations are generally played in an eccentric manner by the player, which furnishes a few qualities dependent on execution with criticism that could be excessively intricate or not explicit enough to make it helpful or even straightforward or to apply. Likewise, when the student gives some input is questionable, which means additionally a decrease of the exhibition (Burgos, 2015).

Anent to this, challenge skills and its dynamic presents a development rule that is likewise intrinsically identified with learning. When learning another expertise, the test of even a fundamental undertaking may surpass an understudy's starting degree of capacity, and henceforth one may feel overpowered. To arrive at stream, the degree of expertise must increment to coordinate the test. Enough practice might be required until the expertise is aced. When failed, a more elevated level of challenge is required for one's aptitude level to increment once more (Felecia, 2014).

Along these lines, people may advance through progressively troublesome difficulties at ever-more significant levels of expertise. Since most computer games permit the player to modify the degree of challenge as abilities are expanding, the proceeding with pattern of new difficulties brings about the slow structure of expanded capabilities focused by the game and in light of the fact that the stream experience is so charming, players are characteristically propelled to improve their aptitudes so as to address the raised difficulty and return stream (Fullagar, S., &Gattuso, S. 2013).

Generally, literature in the game-based reflects comparable comprehension of the marvel that the test in games may drive a players' feeling of stream and commitment (Wang et al., 2014). Earlier research on challenges in game-based situations has undoubtedly demonstrated that challenge and expertise are notable elements prompting the general stream understanding. Moreover, Hung et al., (2015) found that challenge in the game-based learning expanded stream and learning results just as fulfilment (Hung et al., 2015).

However, Ronimuset al. (2014) discovered no huge connection between challenge and youngsters' commitment in a game-based understanding stage. While the elements and conditions identified with stream and inundation in learning exercises are frequently suggested, in general earlier examinations methodically exploring the connections among challenge and aptitude, commitment, submersion and further learning in game-based learning are rare. This examination endeavours to add to the writing right now researching both the predecessors of commitment and submersion just as their effect on learning in important game-based difficulties (Hamari et al., 2014).

Thus, this test aptitude dynamic presents a development rule that is likewise innately identified with learning. When learning another expertise, the test of even an essential assignment may surpass an understudy's starting degree of capacity, and henceforth one may feel overpowered. To arrive at stream, the degree of ability must increase to coordinate the test. Enough practice might be required until the expertise is aced. When aced, a more significant level of challenge is required for one's expertise level to increment once more (Fullagar et al., 2013).

Therefore, people may advance through progressively troublesome difficulties at ever-more elevated levels of aptitude. Since most computer games permit the player to change the degree of challenge as aptitudes are expanding, the proceeding with pattern of new difficulties brings about the steady

structure of expanded capabilities focused by the game. In light of the fact that the stream experience is so charming, players are inherently spurred to improve their abilities to address the raised difficulty and reemerge stream (Bar, et al., 2013).

The sense of immersion characterizing flow experiences is also related to learning and related emotions. For instance, late examinations in neuroscience have exhibited that when a reader is completely immersed in a novel, the human cerebrum is initiated not just in territories liable for consideration; it likewise drastically illuminates in zones controlling effect and feeling (Thompson & Vedantam, 2012).

However, flow theory has been an essential hypothetical base for investigating the ramifications of learning through submersion or "being wrapped" by a virtual learning condition in light of the fact that the enthusiastic piece of these encounters take after stream and hasten a more profound commitment with learning. Research has unequivocally related the feeling of quality, being there, inundation, or stream in various computer-generated simulation interfaces with positive learning results (Abrantes, 2016).

Likewise, there is proof that fantasy through reproductions and games advances characteristic inspiration and can improve learning contrasted with guidance without dream components to some extent by concentrating the student's consideration on pertinent highlights of the learning condition. However, currently there is a dearth of studies that investigate the relationship between immersion and learning in game-based learning environments. The only study (as far as we know) that does so, by Cheng, She, and Annetta (2015), found that immersion has a positive impact on learning outcomes especially when the player’s gaming performance was high (Annetta, et al., 2016).

Overall, according to larger theoretical developments as well as the body of empirical literature there is reason to believe that flow (challenge and skills), engagement, and immersion have a positive impact on learning. Research suggests that increases in challenge and skills relate to higher degrees of engagement and immersion; and that challenges, skills, engagement, and immersion may relate to increased learning directly in addition to the mediated effects (Chenget al., 2015).

A social interaction is an exchange between two or more individuals and is a building block of society. Social interaction can be studied between groups of two or dyads, three or triads or larger social groups. By interacting with one another, people design rules, institutions and systems within which they seek to live. Symbols are used to communicate the expectations of a given society to those new to it. The empirical study of social interaction is one of the subjects of microsociology (Slavin, 2014).

Furthermore, strategies incorporate emblematic interactionism and ethnomethodology just as later scholarly sub-divisions and concentrates, for example, psychosocial examines, conversational examination and human-PC communication. With representative interactionism, the truth is viewed as

social, created association with others. Ethnomethodology questions how individuals' connections can make the fantasy of a common social request in spite of not seeing each other completely and having varying viewpoints (Xu, 2016).

However, well-developed social interaction skills are critical for developing positive self-esteem, building relationships, and ultimately for acceptance into society. To discuss adequately with others, build up fellowships, constructive social connections, and be seen as an affable individual, an individual must exhibit great social aptitudes. Natural in social collaboration are the verbal or marked expressive and open language aptitudes required to carry on a discussion. Comprehension and utilizing nonverbal relational abilities the subtleties of outward appearances and non-verbal communication are likewise basic social aptitudes used to pass on various feelings and emotions (Trigwell, 2014).

Moreover, social interaction skills are essential for engaging with others; yet, much of the content in this area is typically learned through casual observation of others. Since youngsters who are visually impaired or outwardly debilitated can't coolly see how others collaborate and connect socially, they need deliberate and intentional guidance to learn social abilities (Prosser, 2014).

In addition, online multiplayer games regularly empower association between players: some go even similar to requesting it. Cooperation with different players might be essential for gaining ground in a game, or a game might be founded on rivalry between players. Commonplace web-based games can be played freely, without looking for nearer contact with different gamers (Bainbridge, 2010).

However, social interaction is a strong motive not only for playing multiplayer games, but also for forming lasting social relationships with other gamers. Internet games depend on the conceivable outcomes of PC systems. This shows in the extent of methods of correspondence that ordinary multiplayer games offer. A solitary game can bolster correspondence dependent on content, picture, and sound. A game may give apparatuses to cooperation between two individuals, just as empower correspondence between entire gatherings and networks. Notwithstanding utilizing the methods of correspondence offered by games, individuals from multiplayer networks may stay in contact eye to eye, via telephone, by means of email (Wright, 2015).

Meanwhile, school can be a positive social encounter for some kids, for other people, it very well may be a bad dream. School is not just a spot where kids get the hang of perusing, composing and math. It is likewise a spot where they figure out how to coexist with others and create social abilities. Social abilities are the aptitudes we have to connect adjust in our social condition. In spite of the fact that understudies do not get reviews on social tests from their educators, their companions are continually giving them reviews on social tests each day. On the off chance that a kid excels on these tests, he is able to be popular and upbeat. He will appreciate school and anticipate coming to class. In the event that a kid bombs these tests, she is adept to learn about detached and left (Turner, 2015).

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

Anent to this, failing a social test can be more agonizing to a kid than failing a perusing or science test. For certain youngsters, social abilities can be the hardest liable to go in school. Social abilities assume a significant job in a kid's enthusiastic wellbeing and prosperity. Without companionships, school can be an exceptionally miserable, desolate spot that a kid should maintain a strategic distance from (Laguador, 2013).

Moreover, children are brought into the world with intrinsic social capabilities similarly as they are brought into the world with other inborn qualities and shortcomings in capacities, for example, consideration, memory, language and engine abilities. Shortcoming in these different aptitudes can contrarily influence a kid's social competency. For instance, kids who experience consideration issues may experience issues tuning in and going to in discussions, be not able to hinder the drive to talk or make statements at wrong occasions. Youngsters with language and correspondence troubles are particularly defenseless against social issues. They may experience issues staying aware of the pace of a discussion, particularly when there is a gathering of youngsters talking. Youngsters with chemical imbalance and Asperger's disorder are particularly sick furnished to manage social circumstances (Dizon, 2013).

However, students come into classes with different degrees of inspiration to learn. Educators need the understudies to make a decent attempt to pick up during the unit and to keep finding out about the branch of knowledge after the class closes. Thus, educators attempt to spur the understudies to learn. There might be an unending number of moves an educator can make that will build understudy inspiration, however instructors apply around one hundred strategies that they think about generally significant and achievable (Wright, 2015).

Nevertheless, people instructing at any degree of an instructive framework can utilize the strategies, which structure classifications to be specific, making content significant to understudy esteems and objectives, helping understudies accomplish their objectives through getting the hang of, giving strong models of picking up, provoking and convincing understudies to get the hang of, building up a constructive relationship with understudies, remunerating understudy accomplishment and learning endeavors, not demotivating understudies, improving understudy learning self-viability, utilizing drawing in showing techniques, utilizing an engaging showing style, giving persuasive criticism, and checking understudy inspiration levels and changing inspiration techniques varying. Besides, they utilized these strategies to great impact, similar to games inside the study hall so as to degree one can decide from understudy assessments and showing grants (Babad, 2015).

Moreover, in social communication, instructors may utilize an assortment of techniques to animate commitment through social collaborations. For instance, understudies might be combined or assembled to work cooperatively on activities, or educators may make scholastic challenges that understudies go after case a benevolent challenge where groups of understudies fabricate robots to finish a particular assignment in the briefest measure of time. Scholarly and co-curricular exercises,

for example, banter groups, mechanical technology clubs, and science fairs additionally unite learning encounters and social associations (Gregory, 2015).

In addition, methodologies, for example, exhibits of learning or capstone ventures may expect understudies to give open introductions of their work, regularly to boards of specialists from the nearby network, while procedures, for example, network-based learning or administration learning like learning through volunteerism can bring community and social issues into the learning procedure. In these cases, finding out about cultural issues, or taking an interest effectively in social causes, can improve commitment (Arnab, 2017).

21st Century Skills

21st century skills tied in with causing among students to turn into a progressively powerful in any school and building up the scholarly limit and study skills that will help later. A practical way to deal with re-mediating21st century abilities deficiencies contrasts from a useful methodology intended to re-intercede improper conduct. While tending to wrong conduct, frequently the objectives are to decrease eccentric conduct that may serve various capacities across understudies as well as situations (Kratochwill, 2014).

Thus, individual behavior change programs may have to be implemented for each student. While tending to 21st century skills deficiencies there are comparative objectives across understudies, which remember expanding or improving execution for aptitudes. A few understudies may experience their training failing to require any psycho-instructive administrations intended to re-intercede wrong social conduct, all understudies get administrations intended to improve scholarly aptitudes. Along these lines, any conversation of approaches intended to re-intercede 21st century aptitudes shortfalls ought to likewise deliver methodology intended to forestall scholastic abilities shortages (Wilson, 2017).

Moreover, 21st century skills are hard to assess utilizing conventional appraisal practices, for example, the famous institutionalized playing situations that permit them to investigate social jobs in-side and outside of the game, structure theories, test new thoughts, and create aptitudes by playing has delineated a cutting edge instructional method that incorporates measurements of learning by being told, 'learning by doing', 'learning through pretend', and at last 'learning by turning out to be'. Numerous fruitful diversion games give fantastically reasonable and vivid conditions where gamer can learn through pretend encounters. These games can give an effective plan model to game-based learning works on (Twining, 2010).

Furthermore, **critical thinking is a term utilized by teachers to portray types of learning, thought, and investigation that go past the retention and review of data and realities. In like manner utilization, basic reasoning is an umbrella term that might be applied to a wide range of types of learning obtaining or to a wide assortment of points of view. In its most essential articulation,**

basic reasoning happens when understudies are dissecting, assessing, deciphering, or incorporating data and applying inventive idea to frame a contention, take care of an issue, or arrive at a resolution (Ross et al., 2014).

Moreover, it is a focal idea in instructive changes that call for schools to put a more noteworthy accentuation on aptitudes that are utilized in every single branch of knowledge and that children can apply in all instructive, profession, and community settings for the duration of their lives. It's likewise a focal idea in changes that question how instructors have generally instructed and what understudies ought to realize eminently, the 21st century aptitudes development, which extensively approaches schools to make scholastic projects and learning encounters that furnish understudies with the most basic and sought after information, abilities, and airs they should be effective in advanced education projects and present-day working environments (Myerson, 2014).

In addition, as advanced education and employment prerequisites become serious, complex, and specialized, defenders contend, understudies will require aptitudes, for example, basic deduction to effectively explore the cutting-edge world, exceed expectations in testing professions, and procedure progressively complex data. Basic reasoning additionally crosses with banters about appraisal and how schools should gauge learning securing. For instance, various decision-testing groups have been regular in government sanctioned testing for quite a long time, yet the substantial utilization of such testing positions underscores and may strengthen the significance of truthful maintenance and review over different abilities (Kane et al., 2013).

Besides, vulnerability schools generally test and grant grades for genuine review, educators will in this way stress retention and review in their instructing, conceivably to the detriment of abilities, for example, basic reasoning that are essentially significant for understudies to have yet unquestionably all the more testing to quantify precisely (Ross et al., 2014).

Meanwhile, communication skills are imperative for a children's scholastic achievement and future vocation possibilities. In the present testing condition, understudies must have scholastic aptitude, yet in addition the imperative abilities to upgrade their learning and employability prospects later on. Communication is a powerful procedure as it includes an association between at least two individuals like the sender and the beneficiary (Lucanos, 2014).

Additionally, the principal motivation behind communication is to transmit contemplations and convictions to someone else. The significant segments of correspondence are verbal correspondence or oral correspondence and non-verbal correspondence. Oral correspondence is the way toward communicating thoughts through the vehicle of discourse and this assumes a critical job in the life of understudies. An individual learns the rudiments of oral correspondence comfortable. The school condition takes this learning step higher by showing the understudy how to connect with friends and

educators the same. The nature of correspondence in understudy life will characterize proficient correspondence further down the road (Kumar, 2015).

However, good communication empowers understudies to acclimatize more from the learning procedure by engaging them to pose important inquiries and talk about questions. Compelling verbal correspondence sustains the procedure of socialization by encouraging new kinships and these thus help the learning procedure. Beneficial correspondence is a lift to vocation advancement. A capacity to pass on considerations in an unmistakable and exact way would assist an understudy with making a positive impression at a meeting and land the position that he merits. Relational abilities instill polished skill in talking styles, methods for self-articulation and mentalities towards others, and these characteristics would hold understudies in great stead in their expert lives (Lata, 2015).

Moreover, creativity is the demonstration of transforming new and creative thoughts into the real world. It described by the capacity to see the world in new manners, to discover concealed examples, to make associations between apparently disconnected wonders, and to create arrangements. It includes two procedures: thinking, at that point delivering. Innovativeness distinguished as a significant point of training all through the world (Lucanos, 2014).

In addition, creativity is a defining psychological factor of what it means to be human. Change is part of the natural flow of life and humans have a unique ability to thrive in conditions of change. Change requires new behaviors, new ways of perceiving and thinking, novel approaches, innovation, creativity. They perceive the world actively through our senses, creating meaning and adapting to its demands in novel and inventive ways. This *inventiveness* can be seen throughout human history in the creation of new technologies, in the forging of new social and communicative constructs, and in the building of aesthetic forms that bring us together in communities. In individual and collective experiences, creativity is the center that holds everything else together. And in learning, creativity is a thread that connects with, interacts with and supports all other elements of learning (Allen et al., 2018).

Anent to this, Dewey stated that in identifying the development of the skills to perform proper judgments as a major aim of education, thus, though indirectly, clubbing the two aims. This aim, however, cannot be achieve without a proper organization of educational experience. In traditional schooling, prevailing throughout the developing world and in developed countries to a certain extent-educational experience planned under the sway of behaviorism. Dewey reckons such an organization of experience as defective and insufficient to achieve proper educational aims (Mckay et al., 2018).

In line with this, research contends that the improvement of innovativeness is firmly identify with the advancement of the aptitude to frame legitimate decisions in various circumstances. The article likewise contends that behaviorism, as the way of thinking fundamental conventional tutoring however it may appear to a couple as an erroneous date, creates reactions in students through a procedure that doesn't altogether improve imaginative forces. The article additionally audits Dewey's situation on

various important issues and finishes up, through a conversation on how instructive experience ought to be arrange, that Dewey's thoughts are useful in creating inventiveness in students (Kelliher, 2014).

Furthermore, a collaborative game-based learning environment is created by incorporating a lattice-based Mind-device to encourage the understudies to share and sort out what they have realized during the game-playing process. To assess the adequacy of the proposed approach, an investigation has been direct in a senior secondary school regular science course to look at the understudies' exhibition as far as their learning perspectives, learning inspiration, self-viability and learning accomplishments (Yang, 2013).

Furthermore, collaboration skills are what enable you to work well with others. Most work environments require collaboration, so these skills include understanding a variety of perspectives, managing priorities, from everyone in the group, and meeting expectations as a reliable member of a team. Successful collaboration requires a cooperative spirit and mutual respect. Employers typically seek employees that function effectively as part of a team and are willing to balance personal achievement with group goals. Just like in the school student leader should select best students to be one of the members of the group (Zuckerman, 2015).

Anent to this, the idea of collaboration seems easy enough, but it can be challenging to collaborate with others. Each person on a team has strength and weaknesses, communication preferences, and personal goals. Company culture also influences collaboration. Some companies value collaboration and provide training on how to collaboration, while others assume that collaboration will naturally happen. In the class activity also if other group have low performance, it can be motivated and maybe acquired ideas and find more strategies from other group (Lawani, 2013).

Meanwhile, collaboration is essential in almost all aspects of life and work. Nearly every imaginable job in business today entails at least some joint effort among members of a team working together collaboratively. This makes cooperation an essential skill in most sectors of the professional world.Building collaboration means building trust. Those most effective at building trust know how to understand a variety of perspectives, manage priorities from everyone in the group, and then decisively meet expectations as a reliable member of a team (Doyle, 2019).

Moreover, successful collaboration requires a cooperative spirit and mutual respect. Employers typically seek employees that function effectively as part of a team and are willing to balance personal achievement with group goals. In some cases, teams that collaborate include members of the same department coordinating on an ongoing activity. In other situations, interdepartmental teams are assembled to form cross-functional teams tasked with completing special projects within a prescribed period (Schinkten, 2015).

However, the experimental results, it is discovered that the brain instrument coordinated communitarian instructive game not just advantages the understudies in advancing their learning perspectives and learning inspiration, yet additionally improves their learning accomplishment and self-adequacy inferable from the arrangement of the information sorting out and sharing office implanted in the collective gaming condition. Coordinated effort is an overwhelming mediation with numerous segments. It is both a procedure advancement and an item advancement, and it involves institutional improvement and change (Huang, 2013).

Correlation Between Measures

Games on the other hand, necessitate the improvement of 21st century aptitudes, which are esteem in the new computerized economy and give a method for surveying those difficult to assess abilities. The present examination demonstrates there is motivation to be idealistic about the capability of the utilizing a game-based learning way to deal with advance 21st century aptitudes improvement (Gee, 2008).

In addition, empirical research on Game-Based learning divided by numerous factors, for example, objective lucidity, input, challenge, inundation, social collaborations. This absence of attachment displays a hindrance to structuring great instructive games and seeing how games can be utilized most adequately in the study hall. The point of this paper is to figure out what experimental proof exists concerning the impacts of Game-Based Learning on 21st century skills and to recognize fruitful game structure components that adjust well to set up learning hypotheses. It was discovered that instructive Game-Based learning structures has something to do with the association planned to help 21st century expertise advancement Therefore, these sorts of games can give goal clarity, feedback, challenge, immersion, social interactions, and give chances to create esteemed 21st century aptitudes like creativity, communication, critical thinking and collaboration (Anderson, 2011).

Meanwhile, games are incredible powers in innovation-improved learning. Games will have compelling impacts in advanced education learning since they will in general make understudies fabricate the 21st century abilities in like manner the 4C's, for example, collaboration, creativity, communication, critical thinking (Johnson et al., 2011).

Moreover, games are frequently touted as significant apparatuses for showing a variety of 21st century abilities on the grounds that as indicated by Squire, (2006) they oblige different learning style and advance a perplexing dynamic setting, aptitudes sets and demeanours inserted in all around structured games are useful for the contemporary, innovation rich universes understudies possess and ultimately games can possibly advance the 21st century abilities perceived as basic for all resident (National Research Council, 2010).

In addition, it is obvious from the expansiveness of research regarding the matter, that computer games do influence learning. While there is boundless accord that games rouse players to invest energy in

task facing the aptitudes a game bestows, some difference over the particular attributes that incite that inspiration exists. By the by, the writing uncovers that few particular structure components, for example, story setting, rules, objectives, rewards, multisensory prompts, and intelligence, appear to be important to invigorate wanted learning results. Additionally, analysts are starting to estimate the subjective procedures that happen through computer game play (Lee, 2014).

Moreover, game-based learning is an academic methodology that stresses the utilization of play in advancing numerous territories of children's 21st century advancement for learning. Free game and guided game are two sorts of game-based learning. The previous is kid coordinated and inside spurred, while grown-ups bolster the last and outfitted at a particular learning objective. Albeit game is a real right in youth and one of the most characteristic pathways to investigation and learning, small kids today are having less chances to play both at home and in school. The expanded accentuation on school availability has driven youth projects to organize organized exercises and testing to the detriment of truly dynamic, game-based learning (Hammer, 2011).

Nevertheless, this customary learning approach has not really demonstrated viable, as it was found to decrease children's inspiration to learn, and to adversely affect their consideration and conduct guideline. Taking into account that youngsters learn best when they are intellectually dynamic and interface with materials in a significant manner, game-based learning ought to turn into an inalienable part of their home and school condition (Lynch, 2016).

In addition, regardless of the numerous advantages related with game-based learning, teachers are frequently vague about how to give such open doors in school, and how to survey the discovering that happens through play. The absence of formal preparing and expanded strain to accomplish the recommended learning results may halfway add to these difficulties (Marchetti, 2015).

Furthermore, it is important to note that children around the world do not have equal opportunities to engage in play-based learning. Relative to children from higher socio-economic backgrounds living in different countries, children from lower income communities are more likely to engage in leisure activities like digital media then to participate in outdoor activities, and or playful activities with adults. The differential access to game-based learning may, in turn, perpetuate the achievement gap among children from different cultural and socio-economic backgrounds. Given the increasing number of young children who are active users of technological devices, parents are highly encouraged to monitor the amount of time children spend on digital media and the types of games they play on them. Ideally, there should be a balance between the amount of digital game and more traditional playful activities, such as make-believe play or outdoor activities (Mathrani, 2016).

Finally, to advance game-based learning openings, guardians and teachers may wish to structure the earth early. By giving a scope of toys like wood squares, expressions and artworks, puzzles, books, ensembles, youngsters would be bound to make imagine play and investigate new prospects.

Notwithstanding setting up the learning condition, guardians and instructors are urged to permit kids to uninhibitedly pick their activities while yet giving inconspicuous direction to guarantee they investigate the correct parts of the earth or potentially game to arrive at the learning objectives (Collin, 2015).

The foregoing presentation and discussion of various literatures had helped bring into focus the importance of Game-based learning practices and 21st century skills of senior high school grade 12 students particularly the science subject. The literature presented had also helped the researcher realized and understand that the Game-based learning practices has a great influence on the 21st century skills of the students.

Theoretical Framework

This study is anchored in the study of Anderson (2011) which states that all types of games can promote meaningful learning through providing players with goal clarity, feedback, challenge, immersion, social interactions, and provide opportunities to develop valued 21st century skills like collaboration, creativity, communication, critical thinking. He was able to relate it to how students spend time and pay attention while playing games. Most of the informants, who plays more time statistically, significantly have higher grades than those who did not, since those games can sharpen the mind of the students especially if it is about logic or puzzle. Further research mentioned that game-based learning and 21st century skills have been gaining an enormous amount of attention through positive effects of games on learning (Anderson, 2011).

The independent variable is supported by Li and Tsai (2013), which states that the concept of constructivism also known as socio-cultural theory and flow theory of learning thus, all types of games promote meaningful learning through goal clarity, feedback, challenge, immersion, and social interaction are the major's theoretical foundations employed by game-based Learning practices in science education. He said that the present study would examine the learning theories that are utilized in game-based Learning related to the 21st century life skill development. Despite a growing interest in games for learning, rigorous empirical evidence is needed to evaluate the potential of game-based Learning with respect to 21st century skills.

The dependent variable is 21st century skills and supported by Binkley (2014) which states that 21st century skills are relevant and dramatically different from skills of the educational system in currently values. The 21st century skills and imaginative range of abilities characterized as critical thinking, communication, creativity and collaboration. Game plan and play expect individuals to be comfortable with media and innovation, and it likewise expects individuals to be inventive and basic masterminds, so it can possibly encourage understudies' 21st century ability improvement. Given the absence of predictable exact proof concerning the viability of game-based learning, this audit means to analyze the latest writing regarding game-based learning and looks to additionally comprehend the impact of games on learning, with a significant spotlight on understudies' 21st century ability improvement.

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Conceptual Framework

Figure 1 presents the conceptual framework of the study and the independent variable is the game-based learning practices with the following indicators, *goal clarity, feedback, challenge, immersion* and *social interaction* (Anderson, 2011). *Goal clarity,* in this study when tasks in the game should be clearly explained at the beginning. *Feedback*, in this study it allows a player to determine the gap between the current stage of knowledge and the knowledge required for ultimate completion of the game's task. *Challenge,* in this study it talks about the game should offer challenges that fit the player's level of skills. *Immersion,* in this study, it defines as a psychological state characterized by perceiving oneself to be enveloped included in, and interacting with an environment that provides a continuous stream of stimuli and experiences.*Social interaction,* in this study, it refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning taught, which extends to the level of motivation they must learn and progress in their education.

On the other hand, 21st century skills are the dependent variable with its indicators: *critical thinking; communication; and creativity and collaboration* (Binkley, 2014). *Critical thinking,* in this study, it refers to the skills include scientific reasoning, systems thinking, computational thinking, decision-making and problem solving. *Creativity,* in this study it includes divergent thinking, innovative thinking, originality, inventiveness and the ability to view failure as an opportunity to improve. *Collaboration,* in this study, it pertains to the ability to work effectively and respectfully with diverse teams, exercise flexibility and willingness to make compromises to accomplish goals and assume shared responsibility. *Communication,* in this study, it refers to the ability to articulate thoughts and ideas in a variety of forms, communicate for a range of purposes and in diverse environments, and use multiple media and technologys.

Significance of the Study

The findings of this study may serve as the basis of Game-Based Learning practices on 21st century skills and to ensure higher level of game-based learning practices of fostering of better learning delivery and to improve academic. performance by applying 21st century skills. This study will also help to improve their teaching method and to understand deeply the importance of coping new lesson attentively for the students to learn particularly in science subject in senior high school. With this strategy in learning practices suggested and recommended by the study, it can enrich, motivate, and meld the approaches that at last became a fundamental growth to the science students (Lucanos, 2015).

It may develop the understanding of administrators in the different styles of learning processes, assessment of previous present knowledge, content standards and methodology of teaching personnel. The results of this study may give motivation to the teaching personnel that they may be able to continue motivating and working their daily tasks. It will improve teaching personnel regarding on how they will teach with dignity, and work effectively to the students with all challenges, collaboration, creativity and fun.

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Furthermore, the results of the study may benefit all teaching personnel in school, district, or entire division of Davao De Oro, which function as front liners in teaching using Game-based learning practices towards 21st century skills down to the department heads of senior high school, which allow them to experience the progress of teaching strategy and delivery among students. Finally, the findings of this study may provide the future researchers a starting point how to expand the coverage of the research in terms of variables covered in the study.

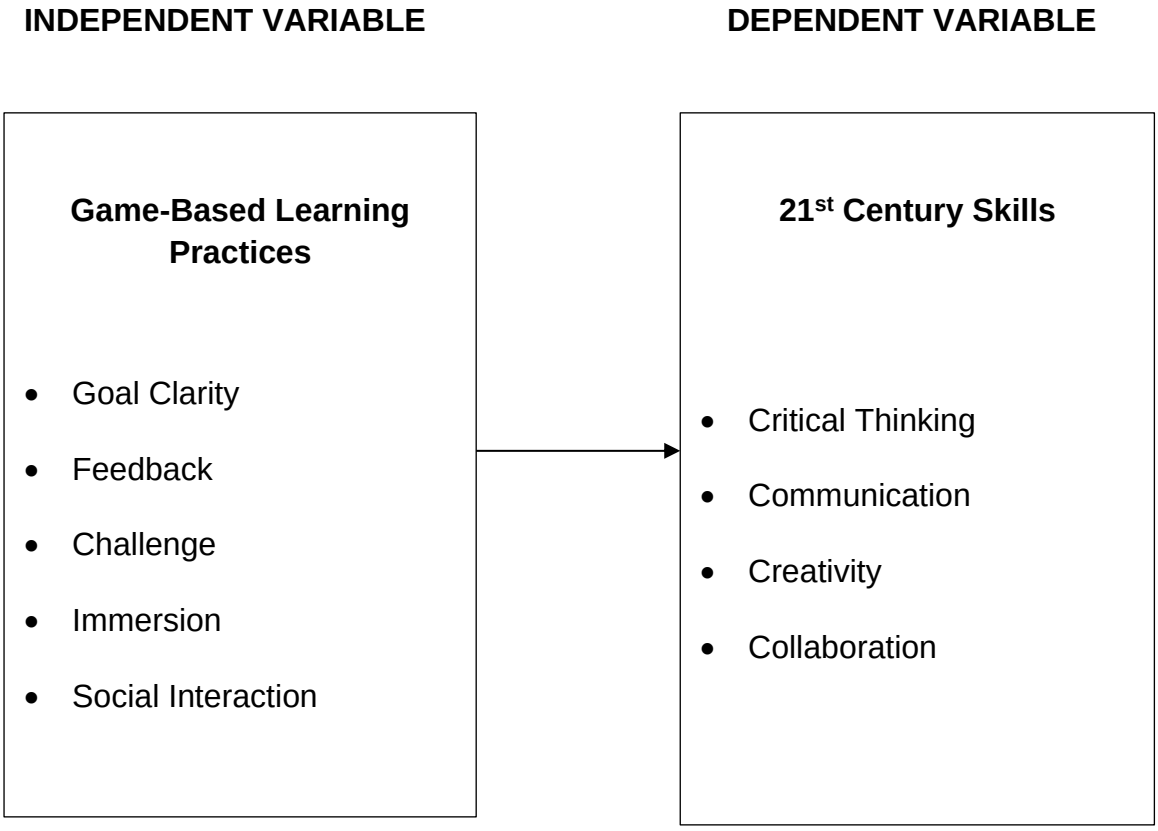

Figure 1. Conceptual Framework of the Study

Definition of Terms

In order for the reader to have a better understanding on the terminologies used in the study, the following terms are defined operationally.

Game-Based Learning Practices. As used in this study, it describes an approach to teaching, where students explore relevant aspect of games in a learning context designed by teachers to add depth and perspective to the experience of playing the game as goal clarity, feedback, challenge, immersion and social interaction (Lee, 2009).

21st Century Skills. As used in this study, it refers to the skills need to deal effectively with the challenges in everyday life, whether at school, at work or in our personal lives and interpret imagery

using visual and spatial reasoning through signs and symbolism in a contemporary format, such as four C's which includes critical thinking; communication; and creativity and collaboration learning skills (Austin, 2010).

Chapter 2

METHOD

This chapter presents the research design, research locale, research respondents and sampling technique, instruments, data gathering procedure and statistical treatment of the data.

Research Design

This study used the quantitative non-experimental research design utilizing causal effect technique focusing on the present condition of the situation, as it existed at the time of the study. This is also explored the relationship and described causes of a phenomenon.

Furthermore, this causal effect design utilized correlation research and correlation analysis, which generally measure if relationship exists and finds out the strength of such relationship between variables being studied. In correlation research, it involved collecting data to find out level of the relationship existed between two or more quantifiable variables (Airasian & Mills, 2011).

Moreover, regression analysis is employed when the focus of the study includes establishing model and analyze several variables in which the relationship being described involves a dependent variable and one or more independent variable in simple terms, regression analysis is a statistical tool that used quantitative approach to examine the nature of relationship among variables This descriptive survey dealt on quantitative data about the influence of game-based learning practices towards 21st century skills among senior high school grade 12 students. The quantitative aspect was an appropriate and timetable for gathering the data designed for the target respondents to answer the questions of the questionnaire that provides clear picture of the event or issue studied in this research (Dudovskiy, 2018).

Research Locale

The findings of this study were all about the game-based learning practices towards the 21st century life skills, there were 485 grade 12 students in senior high school that covers secondary school in the Municipality of Mawab, Davao de Oro Province. They were located at School A, School B, School C, and School D. Presented in Figure 2 is the Map of the Philippines highlighting the Municipality of Mawab, Province of Davao de Oro is located in Region XI, Davao Region. Mawab is consisting of 11 Barangays. The study was conducted last November 2019, second quarter of the school year 2019-2020. Moreover, it was also showed the vicinity map of the Province of Davao de Oro where Municipality of Mawab located.

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Population and Sample

The researcher used random sampling technique in the selection of the respondents in the study. The distribution of senior high school grade 12 students as shown in the next page as follows: For School A, 21; School B, 40; School C, 24; School D, 11; As an inclusion criteria used in d ning the subject of the study, the researcher considered the four secondary public school in district since the study aimed to determine the significance of game-

Figure 2. **Map of the Philippines Highlighting Mawab, Davao De Oro.**

based learning to 21st century skills of the students where some teachers are observed and well-trained about the integration in science subject particularly in the senior high school department. Grade 11 students and all levels both public and private institution, fall under the exclusion criteria and were not included in this study since they were not able to finish yet the learning competences of science subject. They were treated as separate work environment. Further, the respondents can withdraw anytime, if they feel threatened with the conduct of the study.

Distribution of the Respondents

School	Population	Sample
A	236	121
B	78	40
C	46	24
D	21	11
Total	**381**	**196**

Research Instrument

A downloaded, modified, and adapted questionnaire was utilized in gathering the data. The questionnaires were validated by the panel of experts, both internal and external validators. The summary average means of internal validators is4.60 which means very high and for external validators is 4.75 which is also very high descriptive equivalent. This simply means that the questionnaires validated by the panel of experts were granted and ready for the next steps. The items were subjected into a pilot test first to attest reliability and validity. The result of the pilot test served as the basis in conducting the final survey to the actual respondents. The researcher sent a letter to the school principal of four secondary senior high school of Mawab districts. Upon the approval to the said request, the researcher started to conduct the survey. The questionnaire on the level of game-based learning practices was composed of five indicators: goal clarity, feedback, challenge, immersion and social interaction (Anderson, 2011). The result of Cronbach's alpha on independent variables was 0.921, which was interpreted as very good in internal consistency and advised to conduct study. Each indicator composed of five items, which the respondents rated honestly based on the parameter limits below:

Parameter Limits	Descriptive Equivalent	Description
4.20 - 5.00	Very High	This means that the game-based learning practices are very much observed.
3.40 - 4.19	High	This means that the game-based learning practices are much observed.
2.60-3.39	Moderate	This means that the game-based learning practices are sometimes observed.
1.80-2.59	Low	This means that the game-based learning practices are rarely observed.
1.0 - 1.79	Very Low	This means that the game-based learning practices are never observed.

The questionnaire on the level of 21st century skills is composed of four indicators: critical thinking, communication, creativity and collaborative skills (Binkley, 2014). The result of Cronbach's alpha on dependent variables was 0.909, which very good in internal consistency and advised to conduct study. Each indicator is composed of five items in which the respondents answer honestly based on the parameter limits below.

Parameter Limits	Descriptive Equivalent	Description
4.20-5.00	Very High	This means that 21st century skills are very much observed.
3.40 – 4.19	High	This means that 21st century skills are much observed.
2.60- 3.39	Moderate	This means that 21st century skills are sometimes observed.

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1.80-2.59	Low	This means that 21st century skills are rarely observed.
1.00 - 1.79	Very Low	This means that 21st century skills are never observed.

Data Collection

After the thorough validation of the downloaded, modified, and adapted questionnaires, which were checked by the adviser and validated by the panel members, the researcher was given permission to conduct the final survey to gather the necessary data of the study. The following steps were done. First, the researcher asked authorization from District Supervisor and the Principal of four Senior High School of Mawab in a form of request letter for the distribution of the questionnaire to the specific respondents of the study. After the letter was approved by the four Principals, the researcher went to the school and asks permission to the department head of Grade 12 Department to have their approval in the said study.

Then, the researcher settled a specific date and schedule for the study to be performed. The conduct of the survey was done within two days. The researcher gave and distributed the questionnaires to the respondents. Then, personally gave the instructions to the students to entertained questions for them to fully understand the first part of the survey. After the questionnaires were answered, the researcher compiled and consolidated the given data. The retrieval of the questionnaires was done on the same day. Lastly, data were tallied and presented to the statistician for statistical analysis.

Statistical Tool

The data being gathered were tabulated, analyzed and interpreted using the following tools:

Mean. This was used in determining the level of game-based learning practices and 21st century skills of senior high science students in Mawab District.

Pearson-r. This was utilized to find out significant relationship between game-based learning practices and 21st century skills among senior high school science students and was tested using the α 0.05 level of significance.

Regression Analysis. This was used to determine which domain of the game-based learning practices that significantly predicts the 21st century skills among senior high school science students.

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Ethical Consideration

There are considerable ethical issues and concerns that have specific ramification for this quantitative inquest. Such issues and concerns may arise primarily from the methodology involved in this study. The ethical contests that are pertinent to this research concern the issues of the right to conduct the study, confidentiality, anonymity.

The researcher observed and followed full ethical standards in the conduct of the study following the study protocol assessments and standardized criteria, particularly in managing the population and such as, but not limited to:

Voluntary participation. The Grade 12 students of the secondary schools were given the free-will to participate without any form of consequence or penalty or loss of benefits. Therefore, after the purpose and the benefits of the study will be described and presented to the participating school. Then, the rights of the respondents to, contribute to the body of knowledge were carefully considered and adhered upon.

Privacy and confidentiality. The researcher kept private and utmost confidentiality and respondents' personal information that may be required in the study.

Informed consent process. The research questionnaires were free technical terms that make it easier for the respondents to understand. It gives the respondents a clear view of the benefits they may get after the conduct of this study. The research questionnaire was administered with the consent of the school principal.

Recruitment. The distribution of the respondents showed how the respondents were disseminated. Furthermore, the data collection procedures indicated, as well as how the questionnaires were administered, and the manner of respondents involved in the study.

Risks. The study did not involve in high risks of situations that the respondents may experience in physical, psychological or socio-economic concerns. The study just involves in their field of motivation towards learning.

Benefits. The result of the study benefits Department of education officials of Davao de Oro Division and Senior High School principals particularly the four-secondary school of Mawab District in terms of acquiring information as to the level of game-based learning practices that could influence the 21st century skills of senior high school students.

Plagiarism. The study has no trace nor evidence of misrepresentation of someone else work as his own. The study underwent plagiarisms' detector like grammar or Turnitin software.

Fabrication. The study has no trace of evidence of intentional misinterpretation of what has been done. No making up of data and results, or purposely putting forward conclusions that are not accurate.

Falsification. The study has no trace of purposefully misrepresenting the work to fit a model or theoretical expectation and have no evidence of over claiming or exaggeration.

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Conflict of Interest (COI). The study has no trace of conflict of interest like for example the disclosure of COI which is a set of conditions in which professional judgment concerning primary interest such as participants' welfare or the validity of the research tends to be influenced by a secondary interest such as financial or academic gains or recognition.

Deceit. The study has no trace of misleading he respondents to any potential harm.

Authorship. The researcher of the study is a graduate of Bachelor Secondary Education Major in General Science. The researcher of the study made series of revisions of the paper because of the recommendations made by his adviser. The study also followed the standards of the University of Mindanao Ethics Review Committee for the guidelines of ethical consideration. After their approval, the study underwent pilot testing and the data collected were interpreted for the consistency of the research questionnaire.

Chapter 3

RESULTS

This chapter presents the results, analysis and interpretation of the findings of the study. The data presented both tabular and textual forms. All inferential results were analyzed and interpreted at 0.05 level of significance. The topics discussed in this study were the level of gamed-based learning practices and level of 21st century skills among grade12 science students, significance on the relationship between game-based learning practices and 21st century skills and the regression analysis on the influence of the domain of game-based learning practices to the 21st century skills among senior high school science students.

The standard deviation was used to determine the error on unknown samples. It cannot be noted that the standard deviation ranges from 0.58 – 0.71 which is lesser than 1.0 as the typical standard deviation for 5-points Likert scale (Wittink & Bayer, 1994). This means that the ratings in the accomplished questionnaires are closed to the mean, indicating the consistency of responses among the respondents.

Level of Game-Based Learning Practices

One of the variables used in this study was game-based learning practices, with the following indicators*: goal clarity, feedback, challenge, immersion, and social interaction.* Presented in Table 1 is the summary of level of game-based learning practices of the four secondary schools from the Municipality of Mawab districts In the Division of Davao de Oro in terms of *goal clarity, feedback, challenge, immersion, and social interaction.* The general mean is 3.93 which means that the game-based learning practices is high. This implies that game-based learning practices was observed and applied by the learners. Among the five indicators, the indicator with 4.06 highest mean is *challenges,* followed by *social interaction* with a mean of 3.98. Next, is the *goal clarity* with the mean of 3.95, followed by *immersion* with mean of 3.82 and with least mean is the *feedback* with a mean of 3.81, in which all of the indicators are described as high.

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Table 1. ***Level of Gamed-Based Learning Practices***

Indicators	Mean	SD	Descriptive Equivalent
Goal Clarity	3.95	0.56	High
Feedback	3.81	0.55	High
Challenge	4.06	0.54	High
Immersion	3.82	0.64	High
Social Interaction	3.98	0.65	High
Overall	**3.93**	**0.44**	**High**

Level of 21st Century Skills

Table 2 shows the level of 21st century skills among senior high school science students of the four-secondary school of Mawab District in the Division of Davao de Oro in terms of critical thinking, communication, creativity, and collaboration. The overall mean is 3.77 with a descriptive equivalent of high. Among the four c's indicators, collaboration gets a higher mean of 4.08, followed by critical thinking and creativity with the same mean scores of 3.71, the last is communication with a least mean score of 3.60, and all indicators are described as high. This means that the 21st century skills among senior high school science students are often observed.

Table 2. ***Level of 21st Century Skills***

Indicators	Mean	SD	Descriptive Equivalent
Critical Thinking	3.71	0.55	High
Communication	3.60	0. 62	High
Creativity	3.71	0.71	High
Collaboration	4.08	0. 62	High
Overall	**3.77**	**0.50**	**High**

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Lastly, the other measure with a mean score of 4.08 or high is collaboration. The rating is derived based on the mean scores as appended in table 2 of 4.13 or high for *work in pairs or small groups to complete a task together*, 4.13 or high for *work with other classmates to set goals*, 3.87 or high *for create joint products using contribution from my plan*, 3.99 or high for *present group work to the class, teachers, or others*, and 4.27 or very high for *work as a team to incorporate feedback on group task*. The data imply that the respondents were able to typify 21st century skills in ordinary gaming such as everyday training and practiced.

Significant Relationship between Game-Based Learning Practices and 21st Century Skills among Grade 12 Senior High School Students

Table 3 shows that all the indicators specifically *goal clarity, feedback, challenge, immersion, and social interaction* illustrates that there is a significant relationship between game-based learning practices and 21st century skills among senior high school science students. The r-value for goal clarity is 0.472* with a p-value of 0.001, that shows a positive correlation at 0.222. The r-value for feedback 0.455* with p-value of 0.001 that also shows a positive correlation at 0.207. The r-value for challenge is 0.489* with p-value of 0.001, which shows a positive correlation at 0.239. Next indicator is immersion; the r-value is 0.316* with p-value of 0.001, which also shows another positive correlation at 0.099. Last indicator is social interaction; the r-value is 0.564* with a p-value of 0.001, which shows a positive correlation at 0.318.

Table 3. ***Significant Relationship between levels of Game-Based Learning Practices to 21st Century Skills***

Independent Variable	Dependent Variable	r-value	r^2	p-value	Decision
Goal Clarity		0.472*	0.222	0.001	H_O rejected
Feedback		0.455*	0.207	0.001	H_O rejected
Challenge	**21st century Skills**	0.489*	0.239	0.001	H_O rejected
Immersion		0.316*	0.099	0.001	H_O rejected
Social Interaction		0.564*	0.318	0.001	H_O rejected

*p<0.05

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Table shows that the domains goal clarity, feedback, challenge, immersion, and social interaction have the probability level of 0.001 and is lesser than 0.05 level of significance. Thus, the null hypotheses, which states that there is no significant relationship between the game-based learning practices and the 21st century skills and that there is no domain in the game-based learning practices that significantly predicts the 21st century skills, were also rejected. The r-squared of social interaction has the most significant relationship of 0.318 to 21st century skills and challenge has 0.239, goal clarity has 0.222, feedback has 0.207 and the last indicator is immersion has 0.099. Thus, the interdependence of the variables shows that goal clarity, feedback, challenge, immersion, and social interaction have a significant relationship to the 21st century skills among senior high school science students.

Further, as presented in the table, the first hypothesis, which states that there is no significant relationship between game-based learning practices and the 21st century skills among senior high school science students, is rejected.

Regression Analysis on the Influence of Game-based Learning Practices to 21st Century skills

Presented in Table 4 is the regression analysis on the influence of the domain of game-based learning practices on the 21st century skills among senior high school science students. The table shows the computed F-ratio of 25.79 and p-value of 0.001, which means that there is a significant relationship between game-based learning practices on 21st century skills among senior high school science students. The R-value of 0.636indicating that there is a positive relationship between game-based learning practices on 21st century skills among senior high school science students. The overall R^2 is 0.404 indicating that 40.4% of the students' level of game-based learning practices is explained by goal clarity, feedback, challenge, immersion, and social interaction and the remaining percentage is accountable to the other indicators not included in the study. The indicator challenge has a beta of 0.196* and corresponding p-value of 0.005 which means that there is a significant influence that predicts on the 21st century skills since their probability is 0.005 lesser than 0.05 level of significance. Table 4.

Regression Analysis on Game-Based Learning Practices towards 21st Century Skills

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	T- value	P-value	Decision
	β	Standard Error	Beta			
(Constant)	1.085	0.257				
Goal Clarity	0.107	0.066	0.121	1.628	0.105	H_O not Rejected

Feedback	0.108	0.064	0.121	1.683	0.094	**Ho not Rejected**
Challenge	0.180	0.064	0.196*	2.819	0.005	**Ho is Rejected**
Immersion	0. 037	0.048	0.048	0.772	0.441	**Ho not Rejected**
Social Interaction	0.245	0.056	0.321*	4.386	0.001	**Ho is Rejected**

Dependent Variable: 21st Century Skills

p<0.05 R= 0.636 R^2= 0.404 F= 25.79 p- value = 0.001

The indicator social interaction has a beta of 0.321* and corresponding p-value of 0.001 which also means that there is a significant influence that predicts on the 21st century skills since their probability is 0.005 lesser than 0.05 level of significance.

On the other hand, there are three indicators that the p-value is not less than 0.05 level of significance hence not significantly predicts the 21st century namely; goal clarity, feedback and immersion. The indicator goal clarity has a beta of 0.121 and corresponding p-value of 0.105. Next indicator is feedback, and it has a beta of 0.121 and corresponding p-value of 0.094. Last indicator is immersion and has a beta of 0.048 and corresponding p-value of 0. 441.Further, these also means that the three indicators have no significant influence that predicts on 21st century skills among senior high school science students. Hence, the only focus and majority of attention in learning of the grade 12 students are more challenge and social interaction and not much focus and seldom observed on goal clarity, feedback and immersion.

Further, as presented in the table, the second hypothesis that states that there is no domain in the game-based learning practices that significantly predicts the 21st century skills among senior high school science students are rejected on the two indicators namely; challenge and social interaction. While the three indicators shown in the table and to answer the second hypothesis that states that there is no domain in the game-based learning practices that significantly predicts the 21st century skills among senior high school science students is not rejected.

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Chapter` 4

DISCUSSION

Presented in this chapter, the searcher aims to present additional discussion, and related studies to the findings of the study, the conclusion, and recommendations suggested by the researcher are based on the derived result.

Level of Game-Based Learning Practices

In the previous chapter, it was found out that the level of game-based learning practices of senior high school science students of the four-secondary school of Mawab district in the division of Davao de Oro was high. This is due to high-level rating given by the respondents in goal clarity, feedback, challenge, immersion, and social interaction, which means that the game-based learning practices among senior high school science students, was often observed. Specifically, the game-based learning practices of the students in terms of challenge was often observed. It means that students were highly able to compete one another in order for them and thus, to win the game in challenging way of techniques.

Moreover, students must belaborious and must have complex process, and as indicated by the teachers that participated in the given topic while it involves too heavy investments in resources and time to be considered a feasible part of their working processes. Anent, mastery is about the participant struggling to beat challenges. Boss-fights should never be punishing, they should be challenging and educational. *The most significant impact for players is that they want to feel that they are improving.*

This congruent to the study ofLi & Tsai (2013) states that challenge has constituted a major source competitive advantage for this group and identifies five common reasons for successful challenging games. First, students enjoy without feeling bored or anxious during the flow of the activity in the game. Second, students in this side motivate in an adequate, neither too difficult nor too easy. Third, they observe ‘‘hints” in text that helps their mind to overcome the challenges. Fourth, students are encouraging to improve their talents and skills in learning. Fifth and finally, look that the difficulty and challenges increase as my skills improved.

Furthermore, it was presented in the study conducted by Slavin (2014), that game-based learning practices in terms of social interaction was also observed high, this means that students were able to participate activity specifically the games completion and solving problem in one collaborative effort. In addition, social interaction skills are critical for developing positive self-esteem, building relationships, and ultimately for acceptance into society. To communicate effectively with others, establish friendships, positive social relationships, and be perceived as a likable human being, a person must demonstrate good social skills.

In addition, social interaction encourages students to think, read, conclude, summarize, question, etc. Another student’s comment closely matches Vacca (2011) views: They were able to achieve more,

faster, and more accurately when they worked in groups. In consonance to Vacca (2011) when students work together in cooperative group, students produce more ideas, participate more, and take greater intellectual risks. Another student used the term a hive mind to describe how that particular group worked together, while another student referred to the whole being greater than the sum of the parts. Several students mentioned that learning with others is more effective than learning on their own.

Moreover, as stated and parallel to the study of Austin (1996), game-based learning practices in terms of goal clarity was also highly observed, which means that students must set a clear and specific objective that all affected parties understand and can work towards achieving. The important part of the game-based learning definition is the word specific. A very broad or general goal will not help drive or anyone else to succeed. If goal is simply to shape up, that is not a well-defined goal. It may be broadly accurate but is not helpful to describe what actually has to be done and to give others a clear guide as to what is expected. All goals need to be clear, concise and action-oriented and be expressed in such a way that students can be little doubt about the specific outcome that is being sought.

In line with this, goal clarity can be divided into three broad categories: content research, which focuses on the content of individuals' specific goals like travel, relaxation, structural research, which describes how goals are inter-related by hierarchically, sequentially, and process research, which seeks to characterize how goals influence motivational, information processing, and behavior al patterns.

Furthermore, in the study conducted and in consonance to the study of Thompson and Vedantam (2012) game-based learning practices in terms of immersion was also observed high this means that the sense of immersion characterizing flow experiences is also relate to learning and related emotions. For example, recent experiments in neuroscience have demonstrated that when a reader is fully engrossed in a novel, the human brain is activated not only in areas responsible for attention; it also dramatically lights up in areas controlling affect and emotion which a big help in playing the game. This not only gains their attention but also harnesses the retention of information in a meaningful game play manner. Interaction with game characters and fellow players, allows learners to develop social skills, while complex narratives provide ways to enhance their problem-solving capabilities.

Lastly, in the study conducted and in consonance to the study of Burgos (2015), game-based learning practices in terms of feedback, which was also highly observed. This means that students in educational e-games and simulations are usually played in an unpredictable way. The player or learner, who provides some values based on performance with feedback that could be too complex or not specific enough to make it useful or even easy to understand or to apply. This means that the use of feedback to support game-based learning is to provide the learner with useful and immediate information about his performance more improvement and progressive in next level of competition.

International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

Level of 21ST Century Skills

The previous chapter revealed the level of 21st century skills of senior high school science students in the four secondary school in Mawab district division of Dvao de Oro was high. It implies that the 21st century skills among senior high school science students is often observed. Similar to the study of Binkley et al., (2014) the level of 21st century skills for this study is also high or observed most at all times. Skills relevant to the 21st century are dramatically different from skills the educational system currently values. The 21st century learning, and innovative skill set is defined as critical thinking, creativity, collaboration and communication. Critical thinking skills include scientific reasoning, systems thinking, computational thinking, decision-making and problem solving.

The study is in consonance to Ross (2014) the first indicator for 21st century skills of grade 12 students, which is highly rated, is critical thinking. Critical thinking is an umbrella term that may be applied to many different forms of learning acquisition or to a wide variety of thought processes. In its most basic expression, critical thinking occurs when students are analyzing, evaluating, interpreting, or synthesizing information and applying creative thought to form an argument, solve a problem, or reach a conclusion.

Next indicator with high mean is the communication in parallel to the study of Lucanos (2014). The major components of communication are verbal communication or oral communication and non-verbal communication. Oral communication is the process of expressing ideas through the medium of speech and this plays a crucial role in the life of students. An individual learns the basics of oral communication right at home. The school environment takes this learning notch higher by teaching the student how to interact with peers and teachers alike. The quality of communication in student life will define professional communication later in life. These are vital for a student's academic success and future career prospects. In today's challenging environment, students must not only possess academic expertise, but also the requisite skills to enhance their learning and employability prospects in the future.

Another indicator with high mean is creativity congruence to the study of Lucanos (2014). It is characterized by the ability to perceive the world in new ways, to find hidden patterns, to make connections between seemingly unrelated phenomena, and to generate solutions. It involves two processes: thinking, then producing. Creativity is identified as a major aim of education throughout the world. It is closely related to the development of the skill to form proper judgments in different situations. The article also argues that behaviorism, as the philosophy underlying traditional schooling though it might appear to a few as an anachronism, develops responses in learners through a process that does not significantly improve creative powers.

Last indicator with high mean is collaboration congruence to the study of Yang & Huang (2013). It is collaborative game-based learning environment and developed by integrating a grid-based Mind- tool to facilitate the students to share and organize what they have learned during the game-playing process.

To evaluate the effectiveness of the proposed approach, an experiment has been conducted in a senior high school natural science course to examine the students 'performance in terms of their learning attitudes, learning motivation, and self-efficacy and learning achievements.

Significance on the Relationship between Game-Based Learning Practices and 21st Century Skills of Grade 12 Science Students

Outcomes of the study presented that there is a significant relationship between game-based learning and 21st century skills among senior high school science students. The computed R-value indicates that the strength of the relationship between the independent variable and the dependent variable and there is a positive correlation between variables. This study is anchored on the theory of Li & Tsai (2013), the present study reveals a high positive significant relationship between game-based learning practices and 21st century skills of students. The significant relationships among game-based learning including goal clarity, feedback, challenge, immersion, and social interaction. Findings from multiple studies suggested the need for 21st century skills of the students. Overall, this review of extent literature suggested the need for additional research and empirically supported practices for 21stcentury skills of the students.

However, in these efforts there has been a lack of specific emphasis on the relationships of game-based learning practices to 21st century skills of the students including various forms of goal clarity, feedback, and immersion. Likewise, in parallel with study of Binkley (2014), the relationship of 21st century including the various forms of critical thinking, communication, creativity, and collaboration. Correlation analyses indicated that students with more challenge, and social interaction were more likely to endorse game-based learning to 21st century skills that caused them to feel tense and upright and that negatively affected their 4 c's (critical thinking, communication, creativity, and collaboration).Students who has less goal clarity, feed backing, challenge, and immersion additional investigation into factors influencing students' abilities on game-based learning to 21st century skills.

Regression Analysis of Game-based learning Practices towards 21st century Skills among Senior High School Science Students

The regression analysis on the influence that significantly predicts game-based learning practices on the 21st century skills among senior high school science students showed that the domain social interaction influenced most to the 21st century skills among senior high school science students of the four secondary school of Mawab district. The result was supported by the study of Anderson and Lee (2014), positive relationship between game-based learning practices is a pedagogical approach that emphasizes the use of play in promoting multiple social interaction areas of children's 21st century development for learning most especially in the group task.

Moreover, free game and guided game are two types of game-based learning. The former is child-directed and internally motivated, while the latter is supported by adults and geared at a specific learning goal. Although game is a legitimate right in early childhood and one of the most natural

pathways to exploration and learning, young children today are having fewer opportunities to play both at home and in school. The increased emphasis on school readiness has led early childhood programs to prioritize structured activities and testing at the expense of physically active, game-based learning.

The regression coefficient is to test the significant influence of the overall game-based learning practices to 21stcentury skills of the senior high school students of public schools in Mawab District. This means that game-based learning practices influences the 21st century skills of the students and is also influenced by other factors. The overall result of the game-based learning practices particularly challenge and social interaction predicts 21st century skills.

Therefore, the null hypothesis in the study is rejected. Results of the current study underscore the importance of game-based learning practices to 21st century skills, which contribution to the current game-based learning practices since previous research focus on the e-game approach. Data also revealed that challenge and has the highest influence in the game-based learning practices with the Beta 0.180, followed by social interaction 0.245, this means that it affects and influence of game-based learning practices towards 21st century skills of senior high school students.

CONCLUSION

Based from the findings of the study, game-based learning practices highly influenced 21st century skills among senior high school science students. The findings revealed that the game-based learning practices in terms of goal clarity, feedback, challenge, immersion, and social interaction was high. In addition, the 21st century skills in terms of critical thinking, communication, creativity, and collaboration were also high. Moreover, among the four indicators of game-based learning practices it was found out that among the five domains (goal clarity, feedback, challenge, immersion, and social interaction) only two domains (challenge and social interaction) have a significant contribution to the 21st century skills among senior high school science students.

The mean indicator for 21st century skills, which has the highest mean score and is highly observed by the respondents on this study is the critical thinking, next is the communication, creativity, with high mean and lastly collaboration with high mean. The overall level of 21st century skills for this study is high.

There is a high positive significant relationship between game-based learning and 21st century skills of students. Game-based learning influences the 21st century skills of the students, which can be seen in the data. Game-based learning approach plays a vast and important role in the lives of many. Students who engage online gaming are directed by teachers giving them significant impact on learning by manipulating such game practices. However, the level of impact is unknown, along with the expectation of what students want from teachers and how do teachers perceive themselves. The teacher's role is highly complex process. Teachers in most setting must complete a variety of tasks

such as planning, motivating, inspiring, practices and game strategies, and organizational tasks, and mentoring students, which does in fact, includes more than teaching fundamental skills and tactics.

Moreover, the important role of teacher in competitive teaching style is student-centered. A good teacher is responsible for supporting metal, psychological, emotional, and physical development of students, so that they can achieve their dreams. However, the answer to the question what makes the student teacher has already been carried out into this area, many issues remain unexplained. It may be caused by mainly by the facts that researchers explore only measurable forms of coaching behaviors and seldom provide insight into the experience of the students.

Recommendation

Based on the findings and conclusion of the study, the researcher hereby recommends that in science subject particularly feed backing must be uplift in order to absorb the new normal way of playing game activities and bring it to the classroom standards. Moreover, students need to notify the new events and new status immediately after the game for them to be improved, and motivated, and on how interested they are in attending and joining the game-based learning. Students must receive feedback on their progress in the game taught. These may teach them to monitor their performance and to encourage their skills if students need to improved and win the competitive learning.

In addition, communication is the lowest means level on the 21st century skills among students that is manifested in the respondents. Conveying their ideas using media other than written papers (e.g. creating charts, videos, blogs, etc.). Students must convey in using multimedia as means of communication whether it is online or other forms of technology. This also motivate students to communicate alone and use their capabilities in expressing their ideas and thought not just like creating and writing into a piece of paper as a traditional way of communication. In addition, answering questions in front of an audience must be encouraged and improved.

Moreover, students must communicate thorough with confidence in front of the audience. Teachers have something to do with learning encouragement and have a teaching on self-reliance among students especially in doing group activities as major role of gamed-based learning practices. Moreover, teachers may also ensure and develop of effective higher way of group communication skills, confidence, eagerness to express idea and creative way of presenting the output performance like drills, reasoning, positive lecture and mentoring. Anent, teachers may use and teach the value of learning in competition as a fundamental in daily lives and not wasting their time in the internet shop outside the school or even their own gadget as wasting their time and apply it inside the classroom in correct procedures of teaching technique.

The significant relationship between game-based learning and 21st century skills suggest that teaching in game-based learning practices influence the 21st century skills. Moreover, the indicators of game-

based learning suitable presentation to specific situation significantly predicts on 21st century skills among senior high school science students in the four secondary school of Mawab district.

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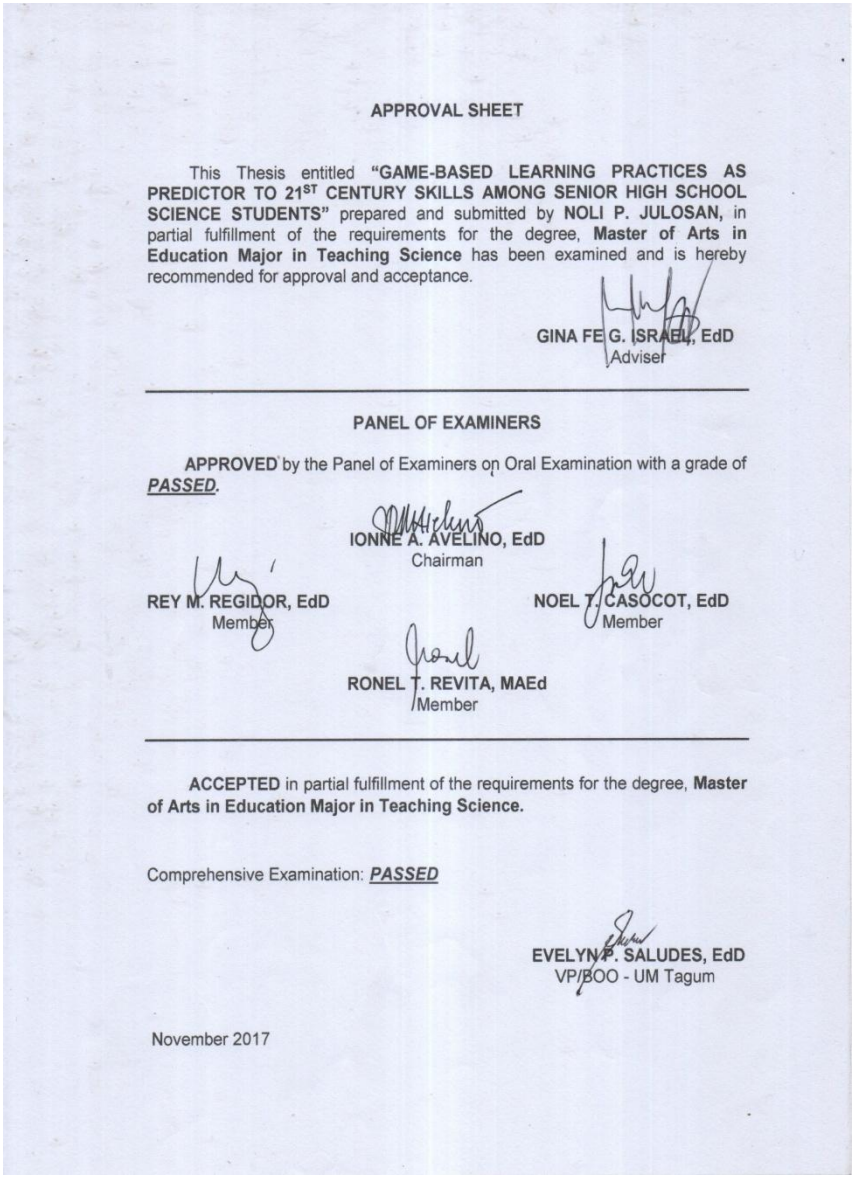

APPROVAL SHEET

This Thesis entitled **"GAME-BASED LEARNING PRACTICES AS PREDICTOR TO 21ST CENTURY SKILLS AMONG SENIOR HIGH SCHOOL SCIENCE STUDENTS"** prepared and submitted by **NOLI P. JULOSAN,** in partial fulfillment of the requirements for the degree, **Master of Arts in Education Major in Teaching Science** has been examined and is hereby recommended for approval and acceptance.

GINA FE G. ISRAEL, EdD
Adviser

PANEL OF EXAMINERS

APPROVED by the Panel of Examiners on Oral Examination with a grade of ***PASSED***.

IONNE A. AVELINO, EdD
Chairman

REY M. REGIDOR, EdD
Member

NOEL T. CASOCOT, EdD
Member

RONEL T. REVITA, MAEd
Member

ACCEPTED in partial fulfillment of the requirements for the degree, **Master of Arts in Education Major in Teaching Science.**

Comprehensive Examination: ***PASSED***

EVELYN P. SALUDES, EdD
VP/BOO - UM Tagum

November 2017

International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

ACKNOWLEDGEMENT

The researcher wishes to express his gratefulness and admiration to the following persons who contributed for the success this study.

The omniscient and omnipotent, Almighty Father, the source of all wisdom, making for his constant love, making all things possible for the researcher to outpace all the difficulties in accomplishing this study;

Dr. Gina Fe G. Israel and **Dr. Susana C. Leng** his current and previous advisers for sharing their proficiency and giving out their expertise that helped a lot in the development of his manuscript.

His panel members: **Dr. Rey M. Regidor, Dr.Ionne A. Avelino,Dr. Noel T. Casocot, Prof. Ronel T. Revita** for their comments, constructive criticisms, corrections and suggestions to improve this study.

Prof. Rex L. Sarvida, his statistician whose undoubtedly intelligent thoughts made his study venture the right path.

Dr. Dan O. Gomez, his editor, who had eye for ensuring the grammatical aspect of his paper comprehensible.

Dr. Reynante A. Solitario, CESE, OIC- Schools Division Superintendent of the Division of Davao de Oro, for allowing the researcher to conduct the study.

The sympathetic school heads of the four public secondary schools of the Municipality of Mawab namely: **Felixberto L. Leray, Melanie C. Caasi, Rogelio A. Gono,** and **Gerardo N. Caasi** for their consent and cooperation by allowing the researcher to conduct his study, and the Grade 12 students in the four secondary schools for their cooperation in accomplishing and answering the questionnaires.

The **LSSSNHS Junior and Senior high school faculty** supervised by **Alma S. Ado, Roberta A. Javier,** and **Vilma J. Fajardo** especially to Science Department Headed by Ma'am **Christine V. Cabuyadao** for cheering him up in those times when he was on the verge of giving up. Thank you for believing in him when he doubted his capabilities. He will always thank God for letting us cross our path;

The dearest family, **Mama Mercy**, **Papa Ars** in heaven my sister and nephews, for the unconditional love and encouragement to finish this paper when he wanted to quit;

The undying supportive friends, for the support which encouraged him to go on to this pursuit which really tried every aspect of him and your understanding in those times when his study gets the best of him;

And lastly but ultimately not the least to this group the beneficiaries of this study the competent Grade 12 students represented by **Joel M. Pagado,Mark Lester B. Basa,Jonel M. Rabe,Ellah Fushia M. Bungabong,Irish D. Gelilang,** for your consistency and love which make him better and make him dream and believe that he can realize that dream. And rest of his close group mates who love had been the source of all his strength to continue seeing life beautiful and wonderful one.

Thank you very much.

NPJ

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DEDICATION

No Research without Action,

No Action without Research – Kurt Lewin

This piece of work is wholeheartedly dedicated to the

Wonderful persons who gave me

the strength,

the inspiration

and the courage

I need in this endeavor.

To the one who gives me inspiration Mama Merz, Papa Arz, Nanay Bengbeng, Sis Inday. To my pillar of strength my aunts and uncles my nephews Zhayahay, and Bliss. My very supportive friends, principals Sir Felixberto L. Leray, Maam Vilma J. Fajardo & co-teachers of Lorenzo S. Sarmiento Sr. NHS both Junior and Senior High School department, CSS family, and above all, to the
One who made this journey possible us
Almighty God and
Father.

APPENDICES

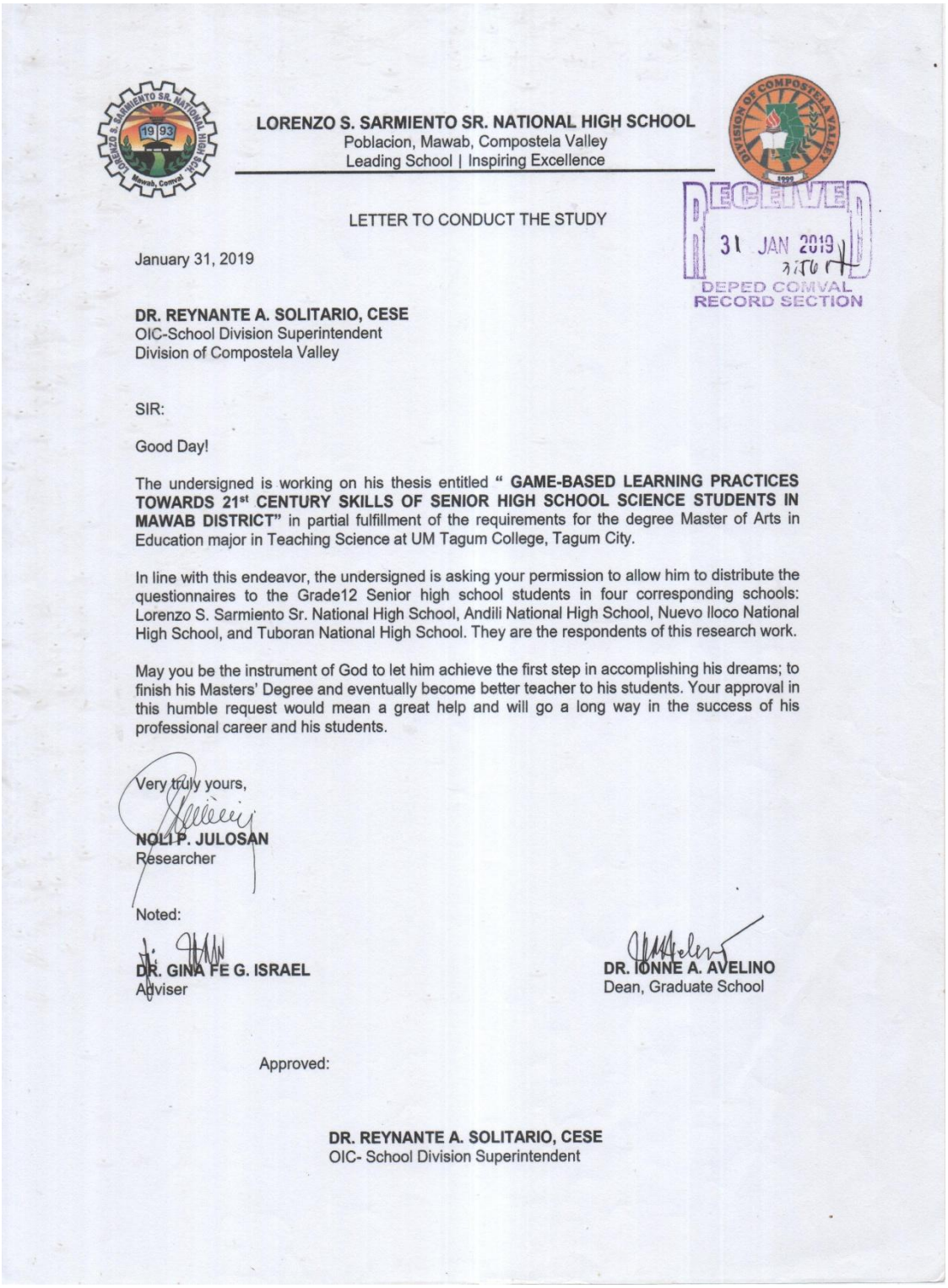
APPENDIX A

Letter to Conduct the Study

International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307



LORENZO S. SARMIENTO SR. NATIONAL HIGH SCHOOL
Poblacion, Mawab, Compostela Valley
Leading School | Inspiring Excellence

RECEIVED
31 JAN 2019
DEPED COMVAL
RECORD SECTION

LETTER TO CONDUCT THE STUDY

January 31, 2019

DR. REYNANTE A. SOLITARIO, CESE
OIC-School Division Superintendent
Division of Compostela Valley

SIR:

Good Day!

The undersigned is working on his thesis entitled **" GAME-BASED LEARNING PRACTICES TOWARDS 21st CENTURY SKILLS OF SENIOR HIGH SCHOOL SCIENCE STUDENTS IN MAWAB DISTRICT"** in partial fulfillment of the requirements for the degree Master of Arts in Education major in Teaching Science at UM Tagum College, Tagum City.

In line with this endeavor, the undersigned is asking your permission to allow him to distribute the questionnaires to the Grade12 Senior high school students in four corresponding schools: Lorenzo S. Sarmiento Sr. National High School, Andili National High School, Nuevo Iloco National High School, and Tuboran National High School. They are the respondents of this research work.

May you be the instrument of God to let him achieve the first step in accomplishing his dreams; to finish his Masters' Degree and eventually become better teacher to his students. Your approval in this humble request would mean a great help and will go a long way in the success of his professional career and his students.

Very truly yours,

NOLI P. JULOSAN
Researcher

Noted:

DR. GINA FE G. ISRAEL
Adviser

DR. IONNE A. AVELINO
Dean, Graduate School

Approved:

DR. REYNANTE A. SOLITARIO, CESE
OIC- School Division Superintendent

International Journal of Education and Social Science Research

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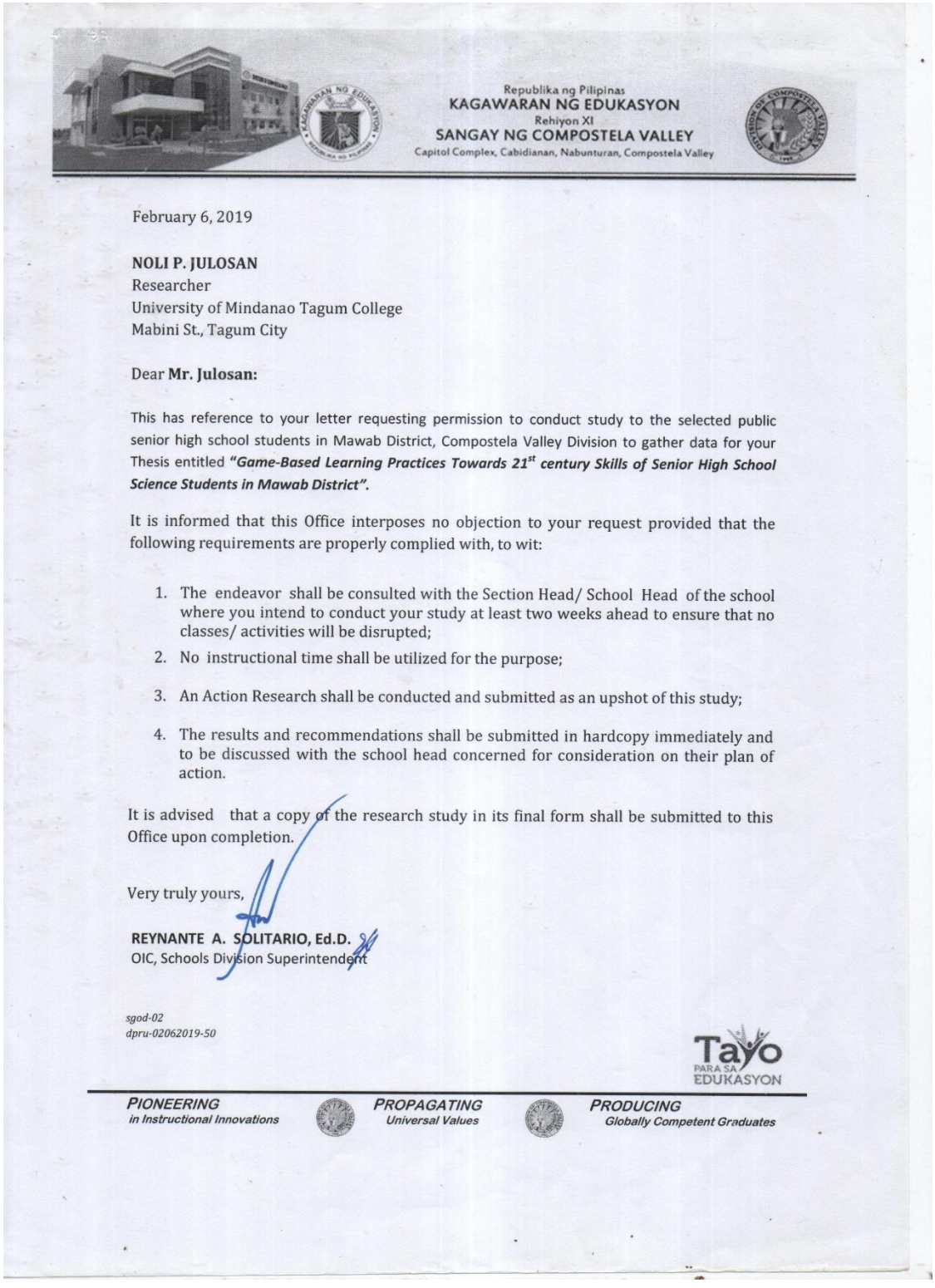

Republika ng Pilipinas
KAGAWARAN NG EDUKASYON
Rehiyon XI
SANGAY NG COMPOSTELA VALLEY
Capitol Complex, Cabidianan, Nabunturan, Compostela Valley

February 6, 2019

NOLI P. JULOSAN
Researcher
University of Mindanao Tagum College
Mabini St., Tagum City

Dear **Mr. Julosan:**

This has reference to your letter requesting permission to conduct study to the selected public senior high school students in Mawab District, Compostela Valley Division to gather data for your Thesis entitled ***"Game-Based Learning Practices Towards 21st century Skills of Senior High School Science Students in Mawab District".***

It is informed that this Office interposes no objection to your request provided that the following requirements are properly complied with, to wit:

1. The endeavor shall be consulted with the Section Head/ School Head of the school where you intend to conduct your study at least two weeks ahead to ensure that no classes/ activities will be disrupted;
2. No instructional time shall be utilized for the purpose;
3. An Action Research shall be conducted and submitted as an upshot of this study;
4. The results and recommendations shall be submitted in hardcopy immediately and to be discussed with the school head concerned for consideration on their plan of action.

It is advised that a copy of the research study in its final form shall be submitted to this Office upon completion.

Very truly yours,

REYNANTE A. SOLITARIO, Ed.D.
OIC, Schools Division Superintendent

sgod-02
dpru-02062019-50

Tayo PARA SA EDUKASYON

PIONEERING in Instructional Innovations | *PROPAGATING* Universal Values | *PRODUCING* Globally Competent Graduates

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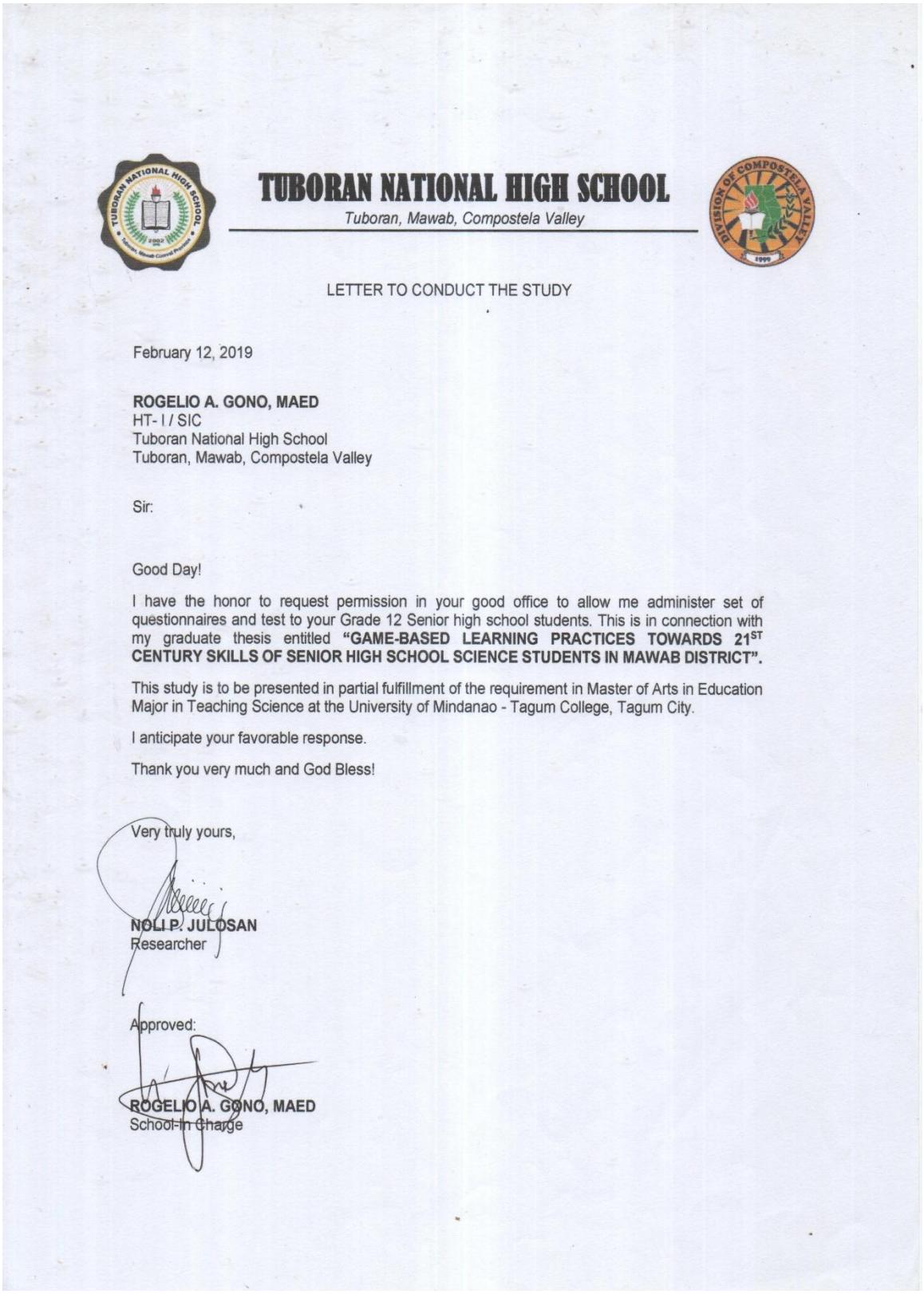

TUBORAN NATIONAL HIGH SCHOOL

Tuboran, Mawab, Compostela Valley

LETTER TO CONDUCT THE STUDY

February 12, 2019

ROGELIO A. GONO, MAED
HT- I / SIC
Tuboran National High School
Tuboran, Mawab, Compostela Valley

Sir:

Good Day!

I have the honor to request permission in your good office to allow me administer set of questionnaires and test to your Grade 12 Senior high school students. This is in connection with my graduate thesis entitled **"GAME-BASED LEARNING PRACTICES TOWARDS 21ST CENTURY SKILLS OF SENIOR HIGH SCHOOL SCIENCE STUDENTS IN MAWAB DISTRICT".**

This study is to be presented in partial fulfillment of the requirement in Master of Arts in Education Major in Teaching Science at the University of Mindanao - Tagum College, Tagum City.

I anticipate your favorable response.

Thank you very much and God Bless!

Very truly yours,

NOLI P. JULOSAN
Researcher

Approved:

ROGELIO A. GONO, MAED
School-In Charge

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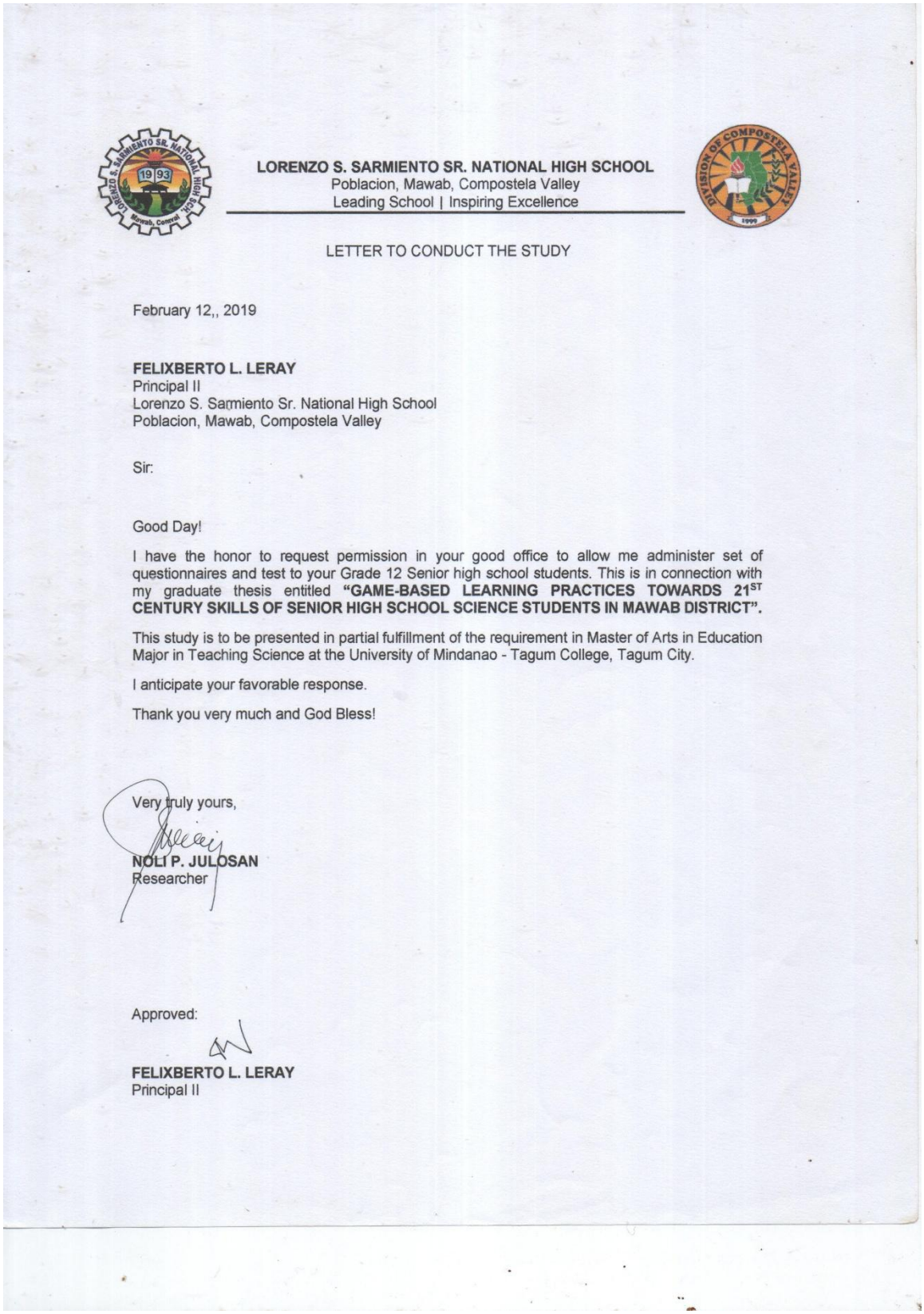

LORENZO S. SARMIENTO SR. NATIONAL HIGH SCHOOL
Poblacion, Mawab, Compostela Valley
Leading School | Inspiring Excellence

LETTER TO CONDUCT THE STUDY

February 12,, 2019

FELIXBERTO L. LERAY
Principal II
Lorenzo S. Sarmiento Sr. National High School
Poblacion, Mawab, Compostela Valley

Sir:

Good Day!

I have the honor to request permission in your good office to allow me administer set of questionnaires and test to your Grade 12 Senior high school students. This is in connection with my graduate thesis entitled **"GAME-BASED LEARNING PRACTICES TOWARDS 21ST CENTURY SKILLS OF SENIOR HIGH SCHOOL SCIENCE STUDENTS IN MAWAB DISTRICT".**

This study is to be presented in partial fulfillment of the requirement in Master of Arts in Education Major in Teaching Science at the University of Mindanao - Tagum College, Tagum City.

I anticipate your favorable response.

Thank you very much and God Bless!

Very truly yours,

NOLI P. JULOSAN
Researcher

Approved:

FELIXBERTO L. LERAY
Principal II

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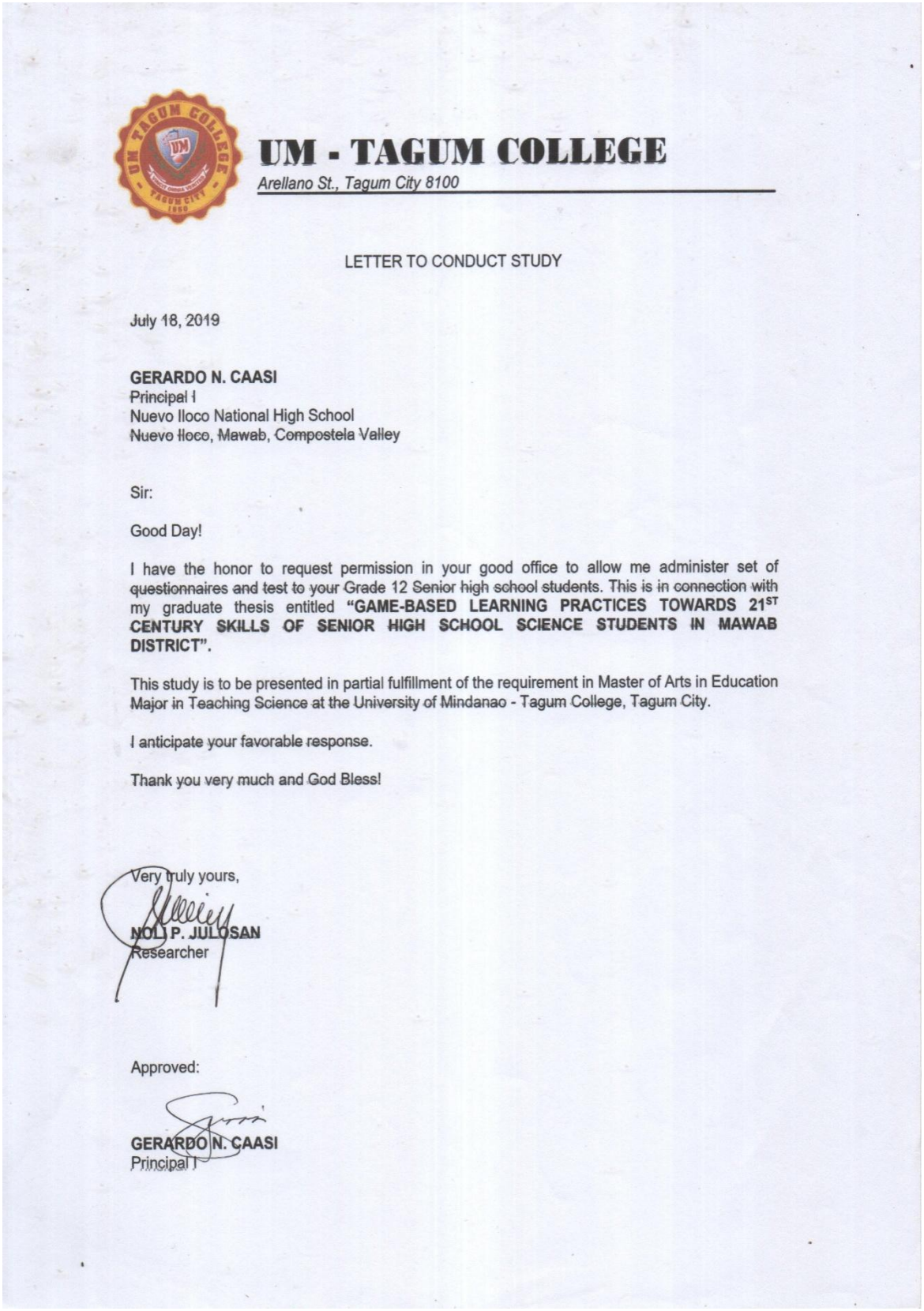

UM - TAGUM COLLEGE

Arellano St., Tagum City 8100

LETTER TO CONDUCT STUDY

July 18, 2019

GERARDO N. CAASI
Principal I
Nuevo Iloco National High School
Nuevo Iloco, Mawab, Compostela Valley

Sir:

Good Day!

I have the honor to request permission in your good office to allow me administer set of questionnaires and test to your Grade 12 Senior high school students. This is in connection with my graduate thesis entitled **"GAME-BASED LEARNING PRACTICES TOWARDS 21ST CENTURY SKILLS OF SENIOR HIGH SCHOOL SCIENCE STUDENTS IN MAWAB DISTRICT".**

This study is to be presented in partial fulfillment of the requirement in Master of Arts in Education Major in Teaching Science at the University of Mindanao - Tagum College, Tagum City.

I anticipate your favorable response.

Thank you very much and God Bless!

Very truly yours,

NOLI P. JULOSAN
Researcher

Approved:

GERARDO N. CAASI
Principal I

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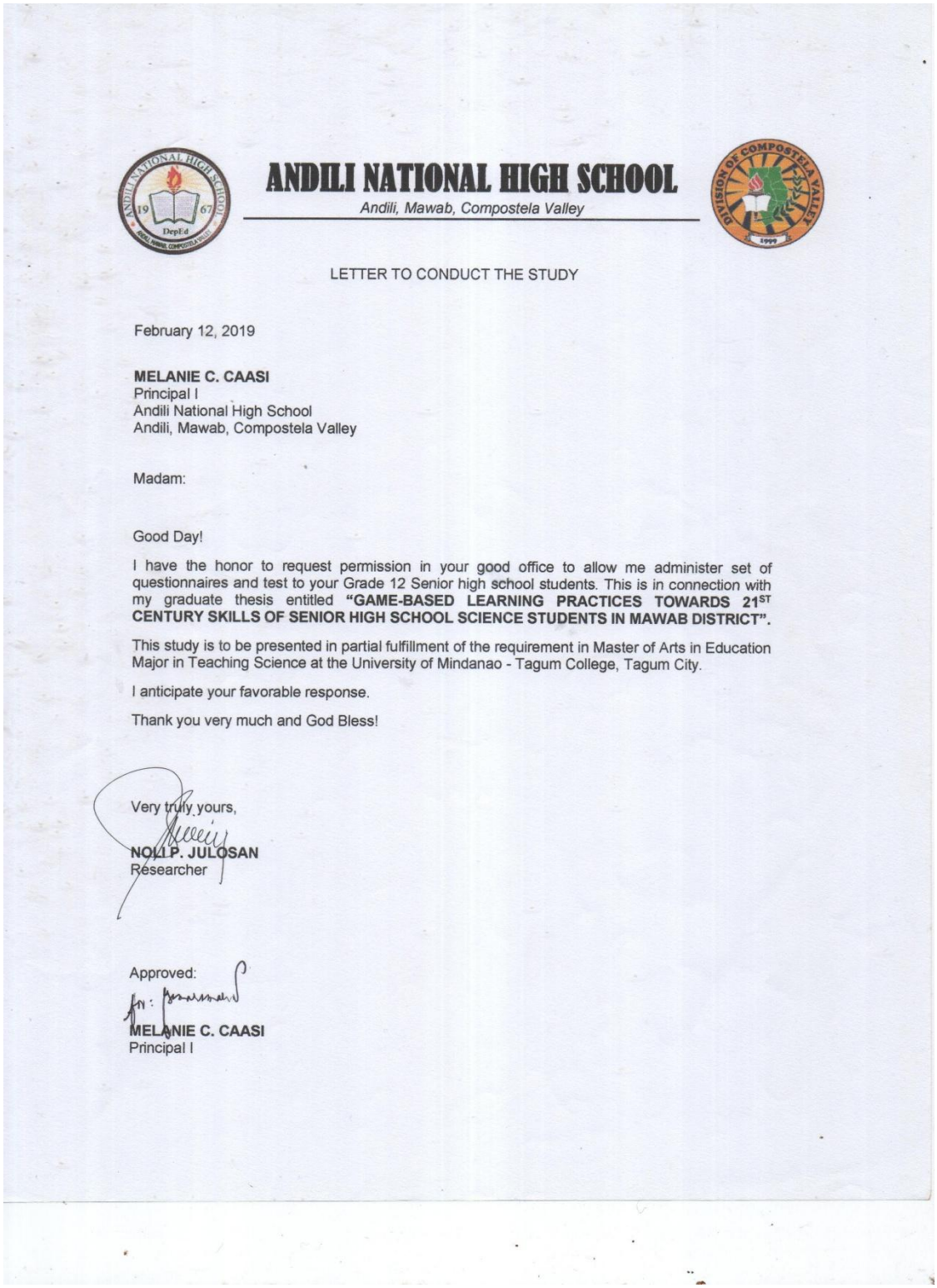

ANDILI NATIONAL HIGH SCHOOL
Andili, Mawab, Compostela Valley

LETTER TO CONDUCT THE STUDY

February 12, 2019

MELANIE C. CAASI
Principal I
Andili National High School
Andili, Mawab, Compostela Valley

Madam:

Good Day!

I have the honor to request permission in your good office to allow me administer set of questionnaires and test to your Grade 12 Senior high school students. This is in connection with my graduate thesis entitled **"GAME-BASED LEARNING PRACTICES TOWARDS 21ST CENTURY SKILLS OF SENIOR HIGH SCHOOL SCIENCE STUDENTS IN MAWAB DISTRICT".**

This study is to be presented in partial fulfillment of the requirement in Master of Arts in Education Major in Teaching Science at the University of Mindanao - Tagum College, Tagum City.

I anticipate your favorable response.

Thank you very much and God Bless!

Very truly yours,

NOLI P. JULOSAN
Researcher

Approved:

MELANIE C. CAASI
Principal I

International Journal of Education and Social Science Research

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APPENDIX B

Questionnaire on Game-Based Learning Practices

A QUESTIONNAIRE ON THE GAME-BASED LEARNING PRACTICES

Name (Optional): _____Male: ☐ Female: ☐

School: _____

I. GAME-BASED LEARNING PRACTICES

DIRECTIONS: This part is about the observed game-based learning practices. Please encircle the number of your answer based on the given scale below. Please rate honestly.

Scale	Frequency	Meaning
5	Always	The item embodied is observed at all times.
4	Oftentimes	The item embodied is observed on most occasions.
3	Sometimes	The item embodied is observed some instances.
2	Rarely	The item embodied is observed in few cases.
1	Never	The item embodied is not observed at all.

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A. Goal Clarity in the Game-based learning As a student in game-based learning practices, I…					
1. catch the basic goals of the knowledge taught in the game.	5	4	3	2	1
2. notice that the game increases my knowledge clearly.	5	4	3	2	1
3. want to know intermediate goal about the knowledge taught.	5	4	3	2	1
4. try intermediate goal to apply the knowledge in the game.	5	4	3	2	1
5. focus the content and goal of the game and its implications.	5	4	3	2	1

B. Feedback of Game-based learning As a student in game-based learning practices, I…					
1. receive feedback on my progress in the game taught.	5	4	3	2	1
2. participate immediately the feedback on my actions in the game.	5	4	3	2	1
3. receive information on my status such score or level in the participation of the game.	5	4	2	2	1
4. notify of new events immediately after the game	5	4	3	2	1
5. inform on my success or failure of intermediate goal in the game.	5	4	3	2	1

C. Challenge in Game-based learning practices. As a student in game-based learning practices, I…					
1. enjoy without feeling bored or anxious during the flow of the activity in the game.	5	4	3	2	1
2. motivate in an adequate, neither too difficult nor too easy.	5	4	3	2	1
3. observe' 'hints" in text that help me overcome the challenges.	5	4	2	2	1
4. encourage myself by improving of my talents and skills in learning.	5	4	3	2	1
5. look that the difficulty and challenges increase as my skills improved.	5	4	3	2	1

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D. Immersion in Game-based learning practices. As a student in game-based learning practices, I…					
1. forget about time passing while playing the game.	5	4	3	2	1
2. become unaware of my surroundings while playing the game.	5	4	3	2	1
3. temporarily forget worries about everyday life while playing the game.	5	4	2	2	1
4. experience an altered sense of time while playing the game.	5	4	3	2	1
5. feel moderately involved in the game.	5	4	3	2	1

E. Social Interaction in Game-based learning Practices. As a student in game-based learning practices, I…					
1. construct the game content that stimulates my attention.	5	4	3	2	1
2. strongly collaborate with other classmates.	5	4	3	2	1
3. cooperate the game which is helpful to the learning.	5	4	3	2	1
4. interact group workload in the game adequately.	5	4	3	2	1
5. supports social interaction between my classmates in the game.	5	4	3	2	1

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APPENDIX C

Questionnaire on 21st Century Skills

QUESTIONNAIRE ON THE 21ST CENTURY LIFE SKILLS

Name (Optional): _____ Male: ☐ Female: ☐
School: _____

II. 21ST CENTURY SKILLS

DIRECTIONS: This part is about the 21st century skills of the senior high school students. Please encircle the number of your answer based on the given scale below. Please rate honestly.

Scale	Frequency	Meaning
5	Always	The item embodied is observed at all times.
4	Oftentimes	The item embodied is observed on most occasions.
3	Sometimes	The item embodied is observed some instances.
2	Rarely	The item embodied is observed in few cases.
1	Never	The item embodied is not observed at all.

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A. CRITICAL THINKING As a student, I…					
1. compare information from the different sources before completing the task.	5	4	3	2	1
2. draw my own conclusions based on analysis of numbers, facts or relevant information.	5	4	3	2	1
3. summarize or create my own interpretation of what I have read.	5	4	3	2	1
4. develop persuasive argument based on supporting evidences or reasoning.	5	4	3	2	1
5. solve complex problems or answer questions that have no single correct solution or answer.	5	4	3	2	1
B. COMMUNICATION As a student, I…					
1. construct data to use in written products or oral presentations.	5	4	3	2	1
2. convey my ideas using media other than written papers (e.g. creating charts, videos, blogs, etc.)	5	4	3	2	1
3. prepare and deliver an oral presentation to the teachers or others.	5	4	3	2	1
4. answer questions in front of an audience.	5	4	3	2	1
5. decide how I will present my own works or demonstrate my learning.	5	4	3	2	1

C.CREATIVITY As a student, I…					
1. use idea creation techniques such as brainstorming or concept mapping.	5	4	3	2	1
2. generate my own ideas about how to confront a problems and questions.	5	4	3	2	1
3. test out different ideas and work to improve them.	5	4	3	2	1
4. create an original product or performance to express my ideas.	5	4	3	2	1
5. invent a solution to a complex, open-ended question or problem.	5	4	3	2	1

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D. COLLABORATION As a student, I…					
1. work in pairs or small groups to complete a task together.	5	4	3	2	1
2. work with other students to set goals and create a plan for the team.	5	4	3	2	1
3. create joint products using contribution from my classmates.	5	4	3	2	1
4. present group work to the class, teachers, or others.	5	4	3	2	1
5. work as a team to incorporate feedback on group task or products.	5	4	3	2	1

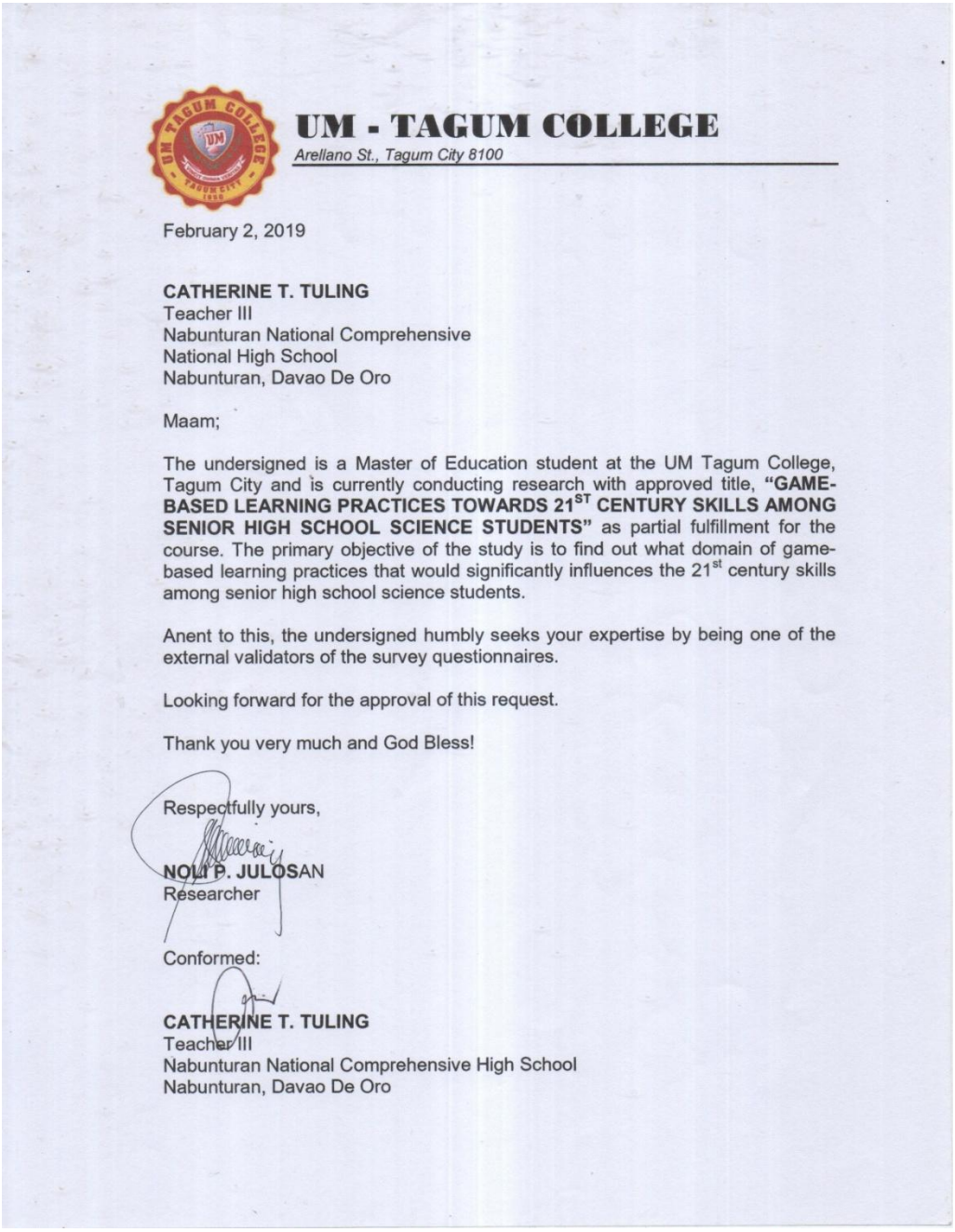
APPENDIX D

Validation of Experts and Summary

SUMMARY OF VALIDATION OF EXPERTS

Name of Validators	Designation	Rating
1. Catherine T. Turing	Teacher III Nabunturan National Comprehensive High School Nabunturan, Davao De Oro	4.00
2. Noel D. Paran	Teacher III Lorenzo S. Sarmiento Sr. National High School Mawab, Davao De Oro	5.00
3. Christine V. Cabuyadao	Master Teacher I Lorenzo S. Sarmiento Sr. National High School Mawab, Davao De Oro	5.00

4. Cristy B. Acosta	Teacher I Lorenzo S. Sarmiento Sr. National High School Mawab, Davao De Oro	5.00
Average		**4.75**



UM - TAGUM COLLEGE
Arellano St., Tagum City 8100

February 2, 2019

CATHERINE T. TULING
Teacher III
Nabunturan National Comprehensive
National High School
Nabunturan, Davao De Oro

Maam;

The undersigned is a Master of Education student at the UM Tagum College, Tagum City and is currently conducting research with approved title, **"GAME-BASED LEARNING PRACTICES TOWARDS 21ST CENTURY SKILLS AMONG SENIOR HIGH SCHOOL SCIENCE STUDENTS"** as partial fulfillment for the course. The primary objective of the study is to find out what domain of game-based learning practices that would significantly influences the 21st century skills among senior high school science students.

Anent to this, the undersigned humbly seeks your expertise by being one of the external validators of the survey questionnaires.

Looking forward for the approval of this request.

Thank you very much and God Bless!

Respectfully yours,

NOLI P. JULOSAN
Researcher

Conformed:

CATHERINE T. TULING
Teacher III
Nabunturan National Comprehensive High School
Nabunturan, Davao De Oro

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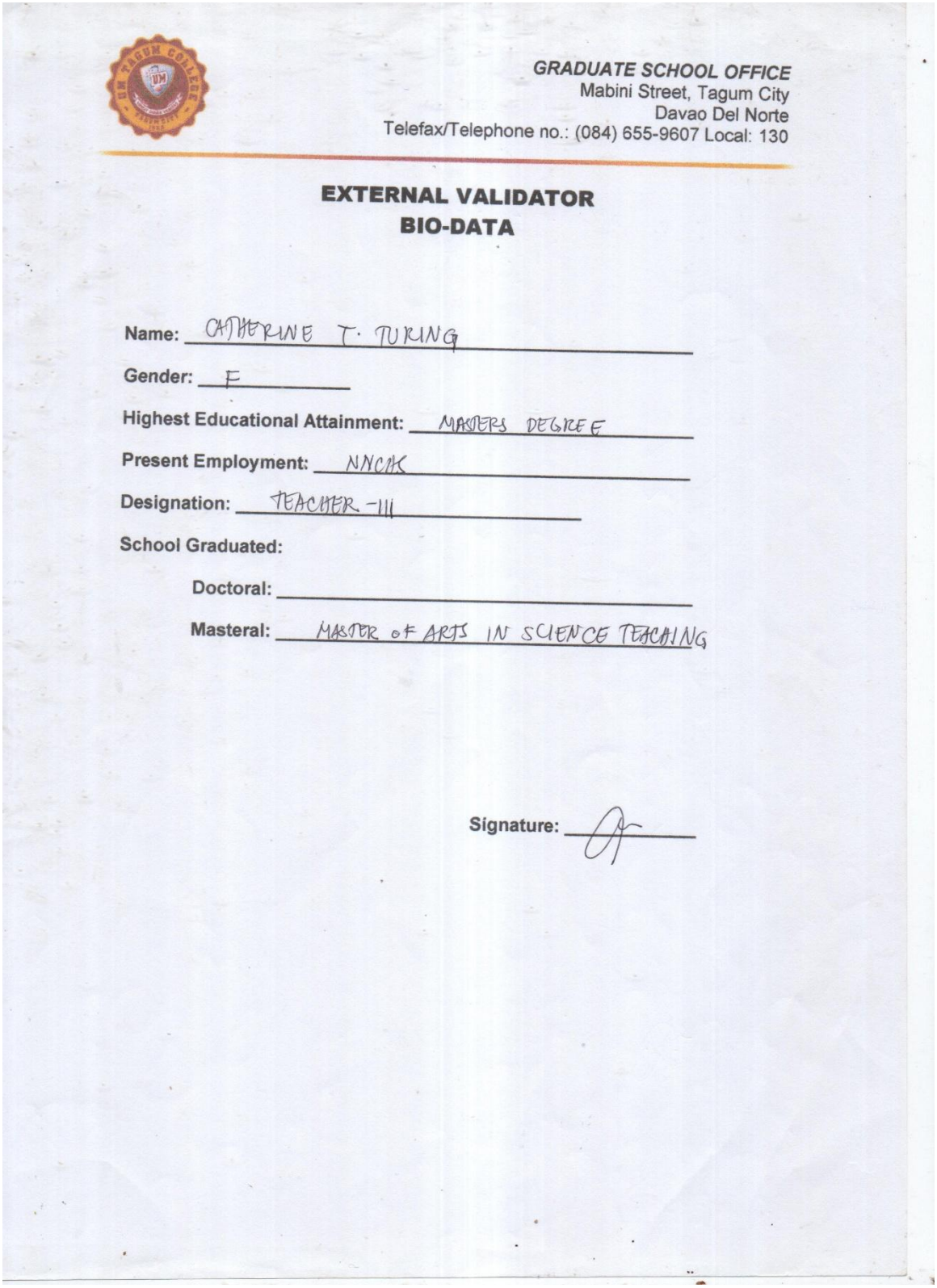

GRADUATE SCHOOL OFFICE
Mabini Street, Tagum City
Davao Del Norte
Telefax/Telephone no.: (084) 655-9607 Local: 130

EXTERNAL VALIDATOR
BIO-DATA

Name: CATHERINE T. TURING

Gender: F

Highest Educational Attainment: MASTERS DEGREE

Present Employment: NNCAC

Designation: TEACHER - III

School Graduated:

Doctoral: _____

Masteral: MASTER OF ARTS IN SCIENCE TEACHING

Signature: _____

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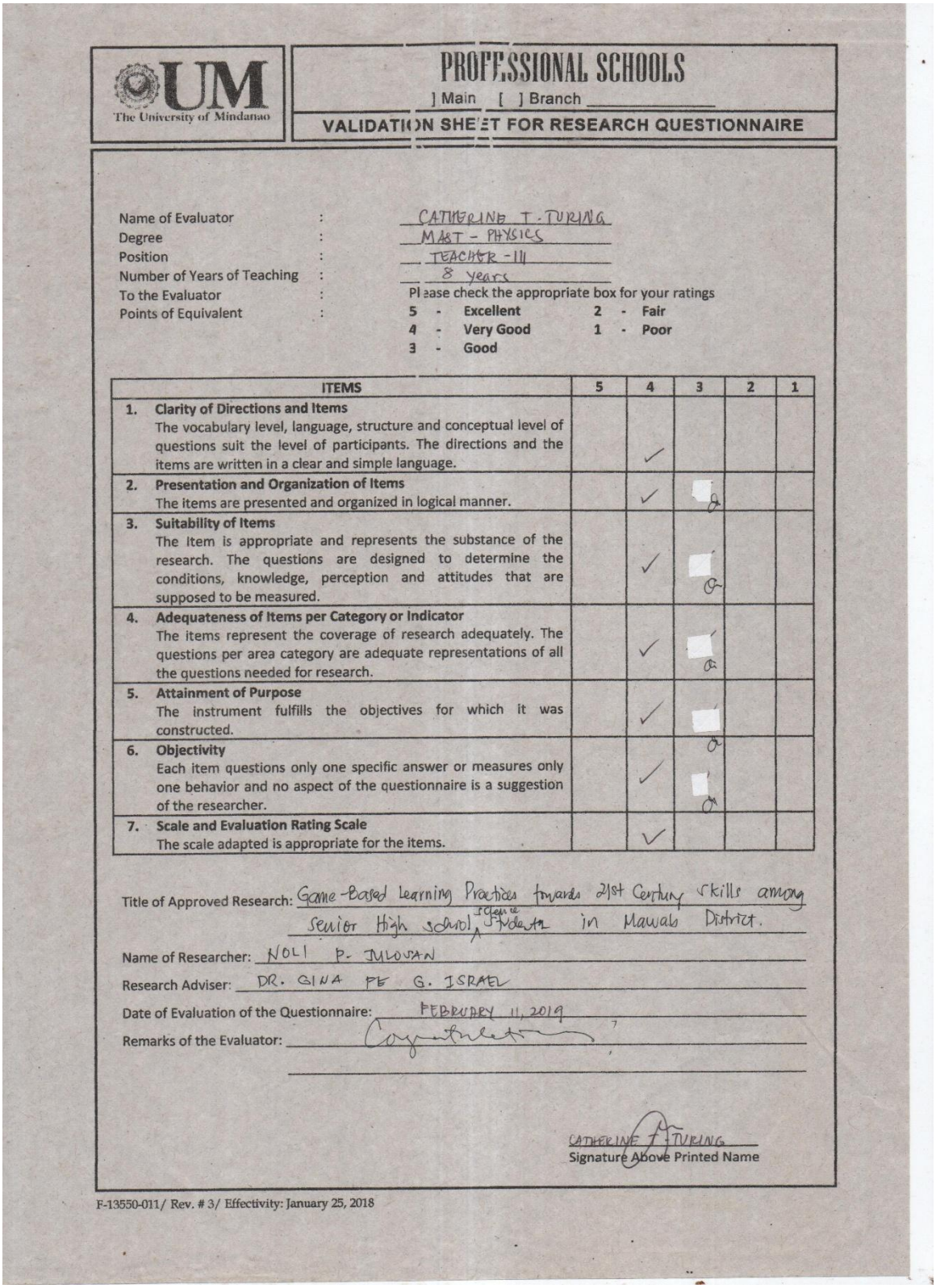

UM
The University of Mindanao

PROFESSIONAL SCHOOLS
[ ] Main [ ] Branch _____
VALIDATION SHEET FOR RESEARCH QUESTIONNAIRE

Name of Evaluator : CATHERINE T. TURING
Degree : MAST - PHYSICS
Position : TEACHER - III
Number of Years of Teaching : 8 years
To the Evaluator : Please check the appropriate box for your ratings
Points of Equivalent :
5 - Excellent 2 - Fair
4 - Very Good 1 - Poor
3 - Good

ITEMS	5	4	3	2	1
1. **Clarity of Directions and Items** The vocabulary level, language, structure and conceptual level of questions suit the level of participants. The directions and the items are written in a clear and simple language.		✓			
2. **Presentation and Organization of Items** The items are presented and organized in logical manner.		✓			
3. **Suitability of Items** The item is appropriate and represents the substance of the research. The questions are designed to determine the conditions, knowledge, perception and attitudes that are supposed to be measured.		✓			
4. **Adequateness of Items per Category or Indicator** The items represent the coverage of research adequately. The questions per area category are adequate representations of all the questions needed for research.		✓			
5. **Attainment of Purpose** The instrument fulfills the objectives for which it was constructed.		✓			
6. **Objectivity** Each item questions only one specific answer or measures only one behavior and no aspect of the questionnaire is a suggestion of the researcher.		✓			
7. **Scale and Evaluation Rating Scale** The scale adapted is appropriate for the items.		✓			

Title of Approved Research: Game-Based Learning Practices towards 21st Century Skills among Senior High School Students in Mawab District.
Name of Researcher: NOLI P. JULOSAN
Research Adviser: DR. GINA PE G. ISRAEL
Date of Evaluation of the Questionnaire: FEBRUARY 11, 2019
Remarks of the Evaluator: Congratulations

CATHERINE T. TURING
Signature Above Printed Name

F-13550-011/ Rev. # 3/ Effectivity: January 25, 2018

International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

UM - TAGUM COLLEGE
Arellano St., Tagum City 8100

February 2, 2019

NOEL D. PARAN
Teacher III
Lorenzo S. Sarmiento Sr.
National High School
Mawab, Davao De Oro

Maam;

The undersigned is a Master of Education student at the UM Tagum College, Tagum City and is currently conducting research with approved title, **"GAME-BASED LEARNING PRACTICES TOWARDS 21ST CENTURY SKILLS AMONG SENIOR HIGH SCHOOL SCIENCE STUDENTS"** as partial fulfillment for the course. The primary objective of the study is to find out what domain of game-based learning practices that would significantly influences the 21st century skills among senior high school science students.

Anent to this, the undersigned humbly seeks your expertise by being one of the external validators of the survey questionnaires.

Looking forward for the approval of this request.

Thank you very much and God Bless!

Respectfully yours,

NOLI P. JULOSAN
Researcher

Conformed:

NOEL D. PARAN
Teacher III
Lorenzo S. Sarmiento Sr. National High School
Mawab, Davao De Oro

International Journal of Education and Social Science Research

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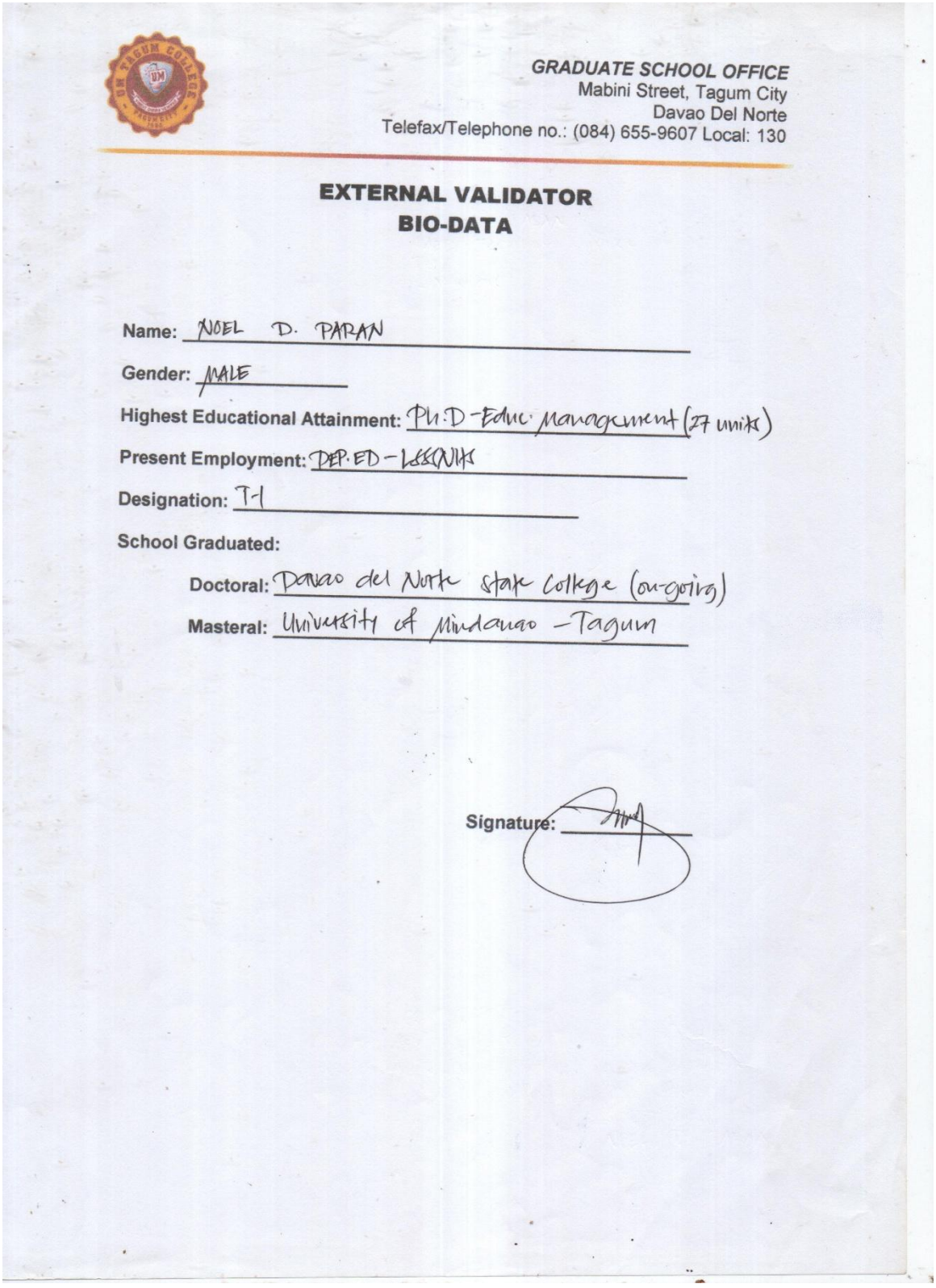
Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307



GRADUATE SCHOOL OFFICE
Mabini Street, Tagum City
Davao Del Norte
Telefax/Telephone no.: (084) 655-9607 Local: 130

EXTERNAL VALIDATOR
BIO-DATA

Name: NOEL D. PARAN

Gender: MALE

Highest Educational Attainment: Ph.D - Educ. Management (27 units)

Present Employment: DEP. ED - LEGAZPI

Designation: T-I

School Graduated:

Doctoral: Davao del Norte State College (on-going)

Masteral: University of Mindanao - Tagum

Signature:

International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

UM
The University of Mindanao

PROFESSIONAL SCHOOLS

[ ] Main [ ] Branch _____

VALIDATION SHEET FOR RESEARCH QUESTIONNAIRE

Name of Evaluator : NOEL D. PARAN
Degree : MAED - Teaching Science
Position : T-1
Number of Years of Teaching : 6X years
To the Evaluator : Please check the appropriate box for your ratings
Points of Equivalent : 5 - Excellent 2 - Fair
4 - Very Good 1 - Poor
3 - Good

ITEMS	5	4	3	2	1
1. **Clarity of Directions and Items** The vocabulary level, language, structure and conceptual level of questions suit the level of participants. The directions and the items are written in a clear and simple language.	✓				
2. **Presentation and Organization of Items** The items are presented and organized in logical manner.	✓				
3. **Suitability of Items** The item is appropriate and represents the substance of the research. The questions are designed to determine the conditions, knowledge, perception and attitudes that are supposed to be measured.	✓				
4. **Adequateness of Items per Category or Indicator** The items represent the coverage of research adequately. The questions per area category are adequate representations of all the questions needed for research.	✓				
5. **Attainment of Purpose** The instrument fulfills the objectives for which it was constructed.	✓				
6. **Objectivity** Each item questions only one specific answer or measures only one behavior and no aspect of the questionnaire is a suggestion of the researcher.	✓				
7. **Scale and Evaluation Rating Scale** The scale adapted is appropriate for the items.	✓				

Title of Approved Research: Game-Based Learning Practices towards 21st Century Skills among Senior High Science Students in Manolo District

Name of Researcher: NOLI P. JULOSAN

Research Adviser: DR. GINA PE G. ISRAEL

Date of Evaluation of the Questionnaire: 02/11/2019

Remarks of the Evaluator: Congratulations for coming up with a relevant research. Research questions are suitable in attaining the objective of the study.

NOEL D. PARAN
Signature Above Printed Name

F-13550-011/ Rev. # 3/ Effectivity: January 25, 2018

International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

UM - TAGUM COLLEGE
Arellano St., Tagum City 8100

February 2, 2019

CRISTINE V. CABUYADAO
Master Teacher I
Lorenzo S. Sarmiento Sr.
National High School
Mawab, Davao De Oro

Maam;

The undersigned is a Master of Education student at the UM Tagum College, Tagum City and is currently conducting research with approved title, **"GAME-BASED LEARNING PRACTICES TOWARDS 21ST CENTURY SKILLS AMONG SENIOR HIGH SCHOOL SCIENCE STUDENTS"** as partial fulfillment for the course. The primary objective of the study is to find out what domain of game-based learning practices that would significantly influences the 21st century skills among senior high school science students.

Anent to this, the undersigned humbly seeks your expertise by being one of the external validators of the survey questionnaires.

Looking forward for the approval of this request.

Thank you very much and God Bless!

Respectfully yours,

NOLI P. JULOSAN
Researcher

Conformed:

CHRISTINE V. CABUYADAO
Master Teacher I
Lorenzo S. Sarmiento Sr. National High School
Mawab, Davao De Oro

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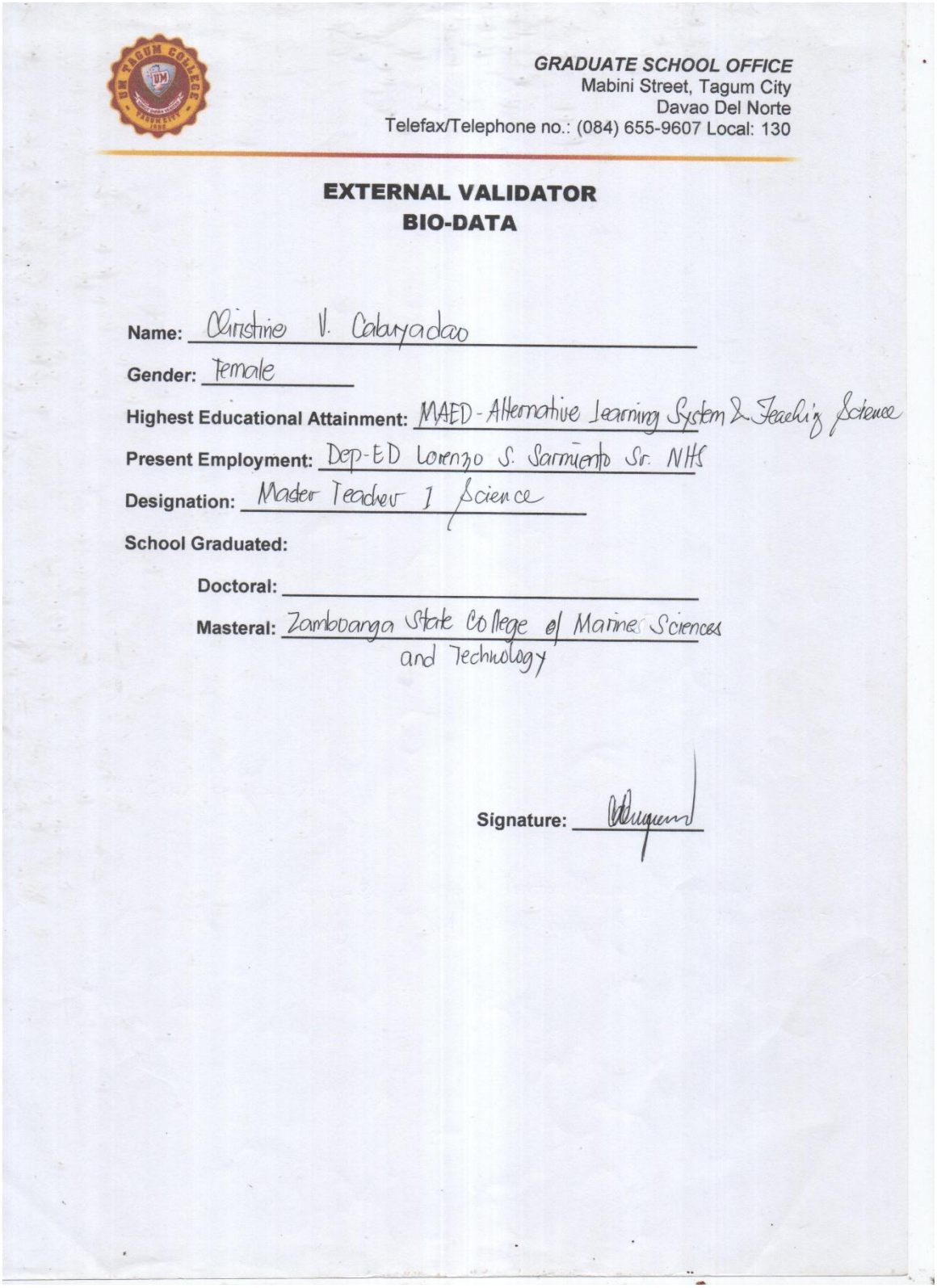
ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307



GRADUATE SCHOOL OFFICE
Mabini Street, Tagum City
Davao Del Norte
Telefax/Telephone no.: (084) 655-9607 Local: 130

EXTERNAL VALIDATOR
BIO-DATA

Name: Christine V. Cabayadao

Gender: Female

Highest Educational Attainment: MAED - Alternative Learning System & Teaching Science

Present Employment: Dep-ED Lorenzo S. Sarmiento Sr. NHS

Designation: Master Teacher I Science

School Graduated:

Doctoral: _____

Masteral: Zamboanga State College of Marine Sciences and Technology

Signature: _____

International Journal of Education and Social Science Research

ISSN 2581-5148

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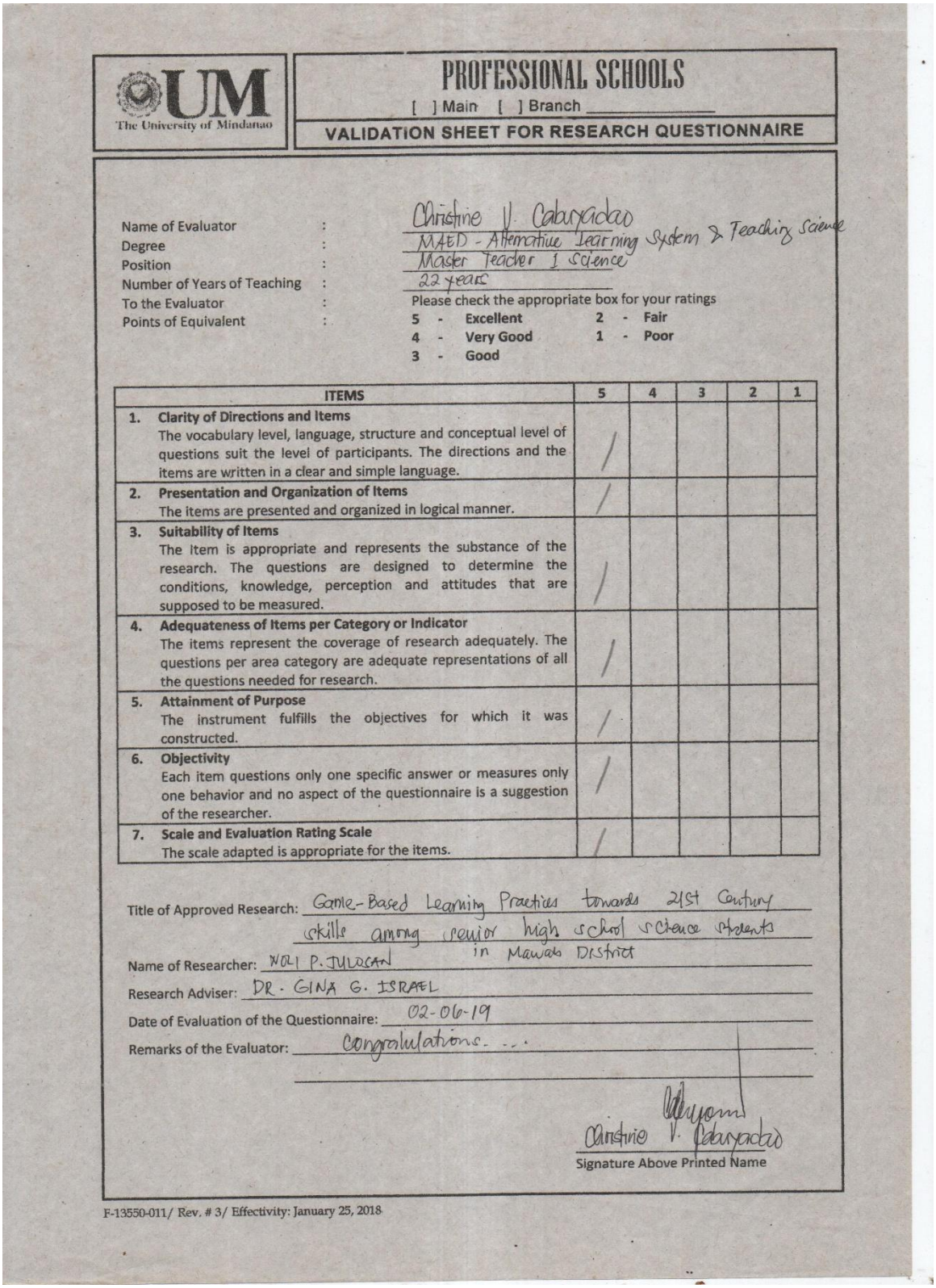

UM
The University of Mindanao

PROFESSIONAL SCHOOLS

[ ] Main [ ] Branch _____

VALIDATION SHEET FOR RESEARCH QUESTIONNAIRE

Name of Evaluator : Christine V. Cabayacao
Degree : MAED - Alternative Learning System & Teaching Science
Position : Master Teacher I Science
Number of Years of Teaching : 22 years
To the Evaluator : Please check the appropriate box for your ratings
Points of Equivalent : 5 - Excellent 2 - Fair
4 - Very Good 1 - Poor
3 - Good

ITEMS	5	4	3	2	1
1. **Clarity of Directions and Items** The vocabulary level, language, structure and conceptual level of questions suit the level of participants. The directions and the items are written in a clear and simple language.	/				
2. **Presentation and Organization of Items** The items are presented and organized in logical manner.	/				
3. **Suitability of Items** The item is appropriate and represents the substance of the research. The questions are designed to determine the conditions, knowledge, perception and attitudes that are supposed to be measured.	/				
4. **Adequateness of Items per Category or Indicator** The items represent the coverage of research adequately. The questions per area category are adequate representations of all the questions needed for research.	/				
5. **Attainment of Purpose** The instrument fulfills the objectives for which it was constructed.	/				
6. **Objectivity** Each item questions only one specific answer or measures only one behavior and no aspect of the questionnaire is a suggestion of the researcher.	/				
7. **Scale and Evaluation Rating Scale** The scale adapted is appropriate for the items.	/				

Title of Approved Research: Game-Based Learning Practices towards 21st Century skills among senior high school science students in Mawab District

Name of Researcher: NOLI P. JULOGAN

Research Adviser: DR. GINA G. ISRAEL

Date of Evaluation of the Questionnaire: 02-06-19

Remarks of the Evaluator: Congratulations. . . .

Christine V. Cabayacao
Signature Above Printed Name

F-13550-011/ Rev. # 3/ Effectivity: January 25, 2018

International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

UM - TAGUM COLLEGE
Arellano St., Tagum City 8100

February 2, 2019

CRISTY B. ACOSTA
Teacher I
Lorenzo S. Sarmiento Sr.
National High School
Mawab, Davao De Oro

Maam;

The undersigned is a Master of Education student at the UM Tagum College, Tagum City and is currently conducting research with approved title, **"GAME-BASED LEARNING PRACTICES TOWARDS 21ST CENTURY SKILLS AMONG SENIOR HIGH SCHOOL SCIENCE STUDENTS"** as partial fulfillment for the course. The primary objective of the study is to find out what domain of game-based learning practices that would significantly influences the 21st century skills among senior high school science students.

Anent to this, the undersigned humbly seeks your expertise by being one of the external validators of the survey questionnaires.

Looking forward for the approval of this request.

Thank you very much and God Bless!

Respectfully yours,

NOLI P. JULOSAN
Researcher

Conformed:

CRISTY B. ACOSTA
Teacher I
Lorenzo S. Sarmiento Sr. National High School
Mawab, Davao De Oro

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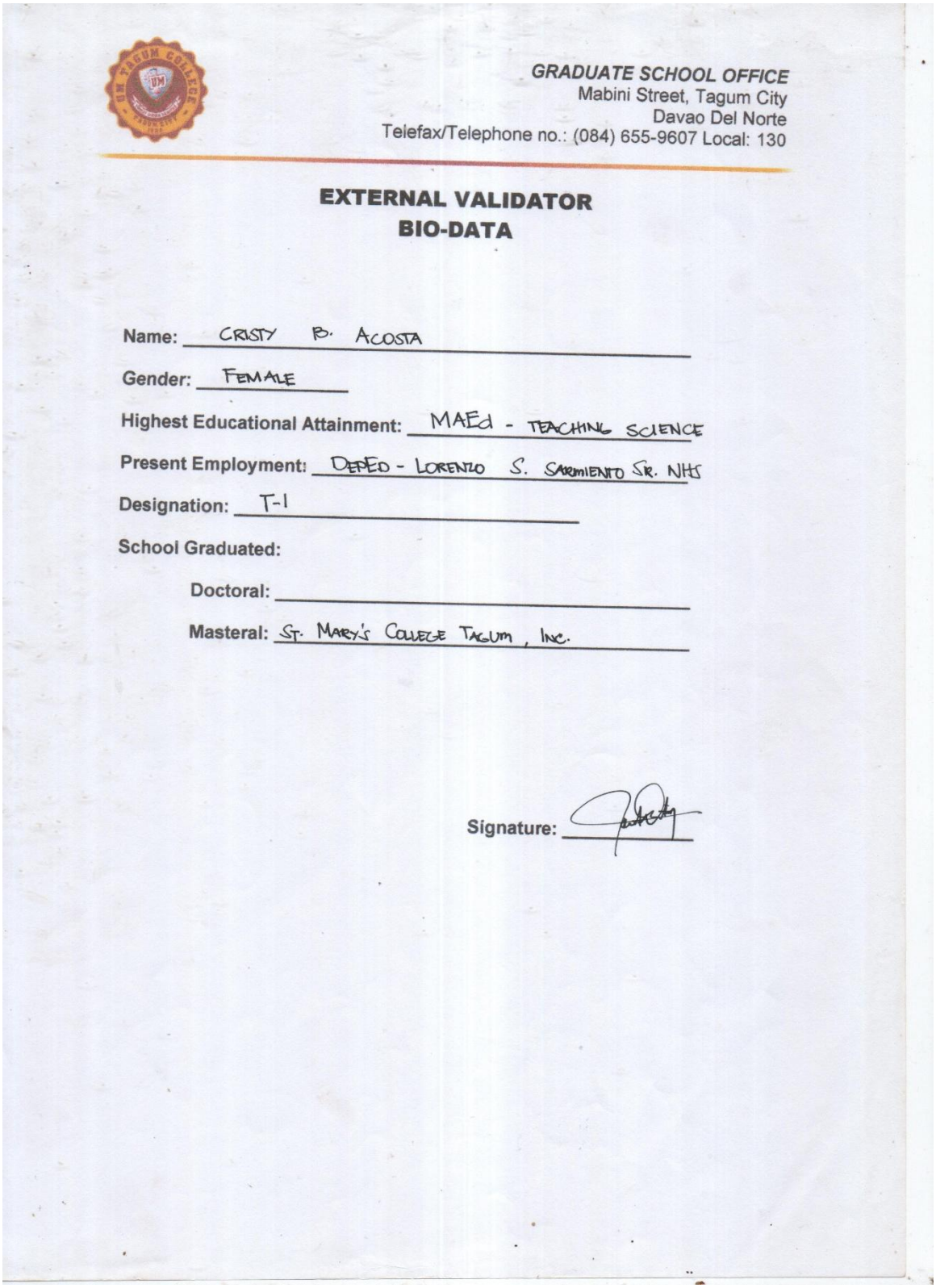

GRADUATE SCHOOL OFFICE
Mabini Street, Tagum City
Davao Del Norte
Telefax/Telephone no.: (084) 655-9607 Local: 130

EXTERNAL VALIDATOR
BIO-DATA

Name: CRISTY B. ACOSTA

Gender: FEMALE

Highest Educational Attainment: MAEd - TEACHING SCIENCE

Present Employment: DEPED - LORENZO S. SARMIENTO SR. NHS

Designation: T-1

School Graduated:

Doctoral: _____

Masteral: ST. MARY'S COLLEGE TAGUM, INC.

Signature: _____

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ISSN 2581-5148

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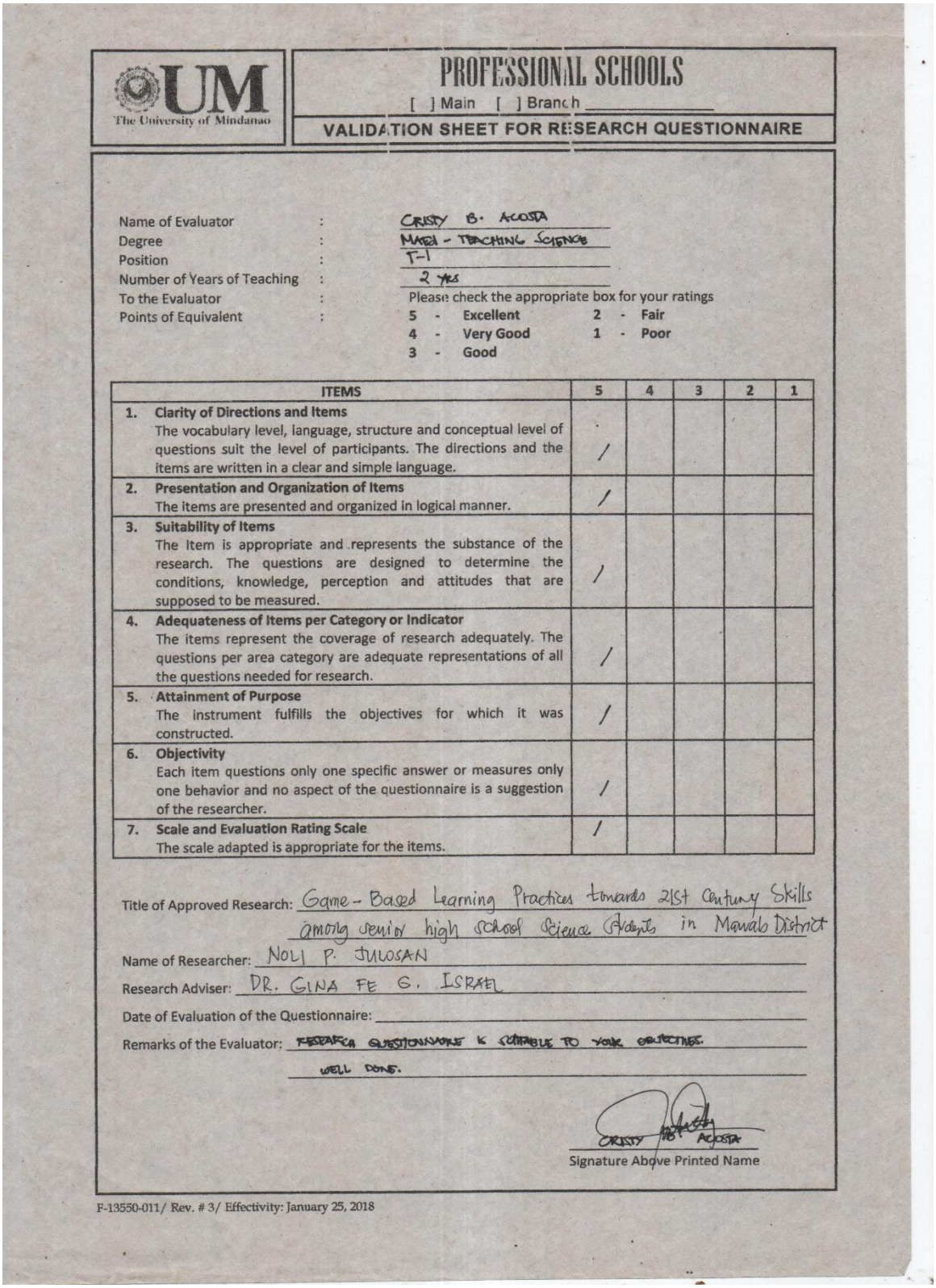

UM
The University of Mindanao

PROFESSIONAL SCHOOLS
[ ] Main [ ] Branch _____
VALIDATION SHEET FOR RESEARCH QUESTIONNAIRE

Name of Evaluator : CRISTY B. ACOSTA
Degree : MAED - TEACHING SCIENCE
Position : T-1
Number of Years of Teaching : 2 yrs
To the Evaluator : Please check the appropriate box for your ratings
Points of Equivalent : 5 - Excellent 2 - Fair
4 - Very Good 1 - Poor
3 - Good

ITEMS	5	4	3	2	1
1. **Clarity of Directions and Items** The vocabulary level, language, structure and conceptual level of questions suit the level of participants. The directions and the items are written in a clear and simple language.	/				
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6. **Objectivity** Each item questions only one specific answer or measures only one behavior and no aspect of the questionnaire is a suggestion of the researcher.	/				
7. **Scale and Evaluation Rating Scale** The scale adapted is appropriate for the items.	/				

Title of Approved Research: Game-Based Learning Practices towards 21st Century Skills among senior high school Science Grade 11 in Marawi District
Name of Researcher: NOLI P. JULOSAN
Research Adviser: DR. GINA FE G. ISRAEL
Date of Evaluation of the Questionnaire: _____
Remarks of the Evaluator: RESEARCH QUESTIONNAIRE IS SUITABLE TO YOUR OBJECTIVES. WELL DONE.

CRISTY B. ACOSTA
Signature Above Printed Name

F-13550-011/ Rev. # 3/ Effectivity: January 25, 2018

International Journal of Education and Social Science Research

ISSN 2581-5148

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APPENDIX E

Appended Table Items

Table 1.1 Level of Game-Based Learning Practices in terms of Goal Clarity

Goal Clarity	Mean	SD	Descriptive Equivalent
1. Catching the basic goals of the knowledge taught in the game.	3.96	0.76	High
2. Noticing that the game increases my knowledge clearly.	4.00	0.85	High
3. Wanting to know intermediate goal about the knowledge taught.	4.04	0.80	High
4. Trying intermediate goal to apply the knowledge in the game	3.82	0.83	High
5. Focusing the content and goal of the game and its implications	3.95	0.80	High
Over-all	3.95	0.56	High

Table 1.2 Level of Game-Based Learning Practices in terms of Feedback

Feedback	Mean	SD	Descriptive Equivalent
1.Receiving feedback on my progress in the game taught.	3.72	0.83	High
2. Participating immediately the feedback on my actions in the game.	3.85	0.85	High
3. Receiving information on my status such score or level in the participation of the game.	4.04	0.82	High
4. Notifying of new events immediately after the game	3.61	0.78	High
5. Informing on my success or failure of intermediate goal in the game.	3.85	0.88	High
Over-all	3.81	0.55	High

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ISSN 2581-5148

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Table 1.3 Level of Game-Based Learning Practices in terms of Challenge

Challenge	Mean	SD	Descriptive Equivalent
6. Enjoying without feeling bored or anxious during the flow of the activity in the game.	4.20	0.86	Very High
7. Motivating an adequate, neither too difficult nor too easy.	3.89	0.80	High
8. Observing‘‘hints” in text that help me overcome the challenges.	3.91	0.84	High
9. Improving my self by developing my talents andskills in learning..	4.19	0.84	High
10. Looking that the difficulty and challenges increase as my skills improved.	4.11	0.79	High
Over-all	4.06	0.54	High

Table 1.4 Level of Game-Based Learning Practices in terms of Immersion

Immersion	Mean	SD	Descriptive Equivalent
1 .Forgetting about time passing while playing the game.	3.85	0.96	High
2. Becoming unaware of my surroundings while playing the game.	3.55	0.94	High
3. Temporarily forgetting worries about everyday life while playing the game.	4.09	0.95	High
4. Experiencing an altered sense of time while playing the game.	3.75	0.75	High
5. Feeling moderately involved in the game.	3.87	0.88	High
Over-all	**3.82**	**0.64**	**High**

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Table 1.5 Level of Game-Based Learning Practices in terms of Social Interaction

Social Interaction	Mean	SD	Descriptive Equivalent
6. Constructing the game content that stimulates my attention.	3.71	0.77	High
2. Strongly collaborating with other classmates.	3.92	0.92	High
3. Cooperating the game which is helpful to the learning.	4.31	0.80	Very High
4. Interacting group workload in the game adequately.	3.84	0.86	High
5.Supporting social interaction between my classmates in the game.	4.13	0.88	High
Over-all	**3.98**	**0.65**	**High**

Table 2.1 Level of 21st Century Skills in terms of Critical Thinking

Critical Thinking	Mean	SD	Descriptive Equivalent
6. Comparing information from the different sources before completing the task.	3.85	0.80	High
7. Drawing my own conclusions based on analysis of numbers, facts or relevant information.	3.65	0.82	High
3. Summarizing or create my own interpretation of what I have read.	3.89	0.86	High
4.Developing persuasive argument based on supporting evidences or reasoning.	3.70	0.80	High
5. Solving complex problems or answer questions that have no single correct solution or answer.	3.43	0.85	High
Over-all	**3.71**	**0.55**	**High**

Table 2.2 Level of 21st Century Skills in terms of Communication

Communication	Mean	SD	Descriptive Equivalent
1. Construct data to use in written products or oral presentations.	3.64	0.84	High
2. Conveying my ideas using media other than written papers (e.g. creating charts, videos, blogs, etc.)	3.47	1.01	High

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3. Preparing and deliver an oral presentation to the teachers or others	3.53	0.87	High
4. Answering questions in front of an audience	3.49	0.90	High
5. Deciding how I will present my own works or demonstrate my learning.	3.87	0.84	High
Over-all	**3.60**	**0.62**	**High**

Table 2.3 Level of 21st Century Skills in terms of Creativity

Creativity	**Mean**	**SD**	**Descriptive Equivalent**
1. Using idea creation techniques such as brainstorming or concept mapping.	3.88	2.32	High
2 Generating my own ideas about how to confront a problems and questions.	3.68	0.82	High
3. Testing out different ideas and work to improve them.	3.77	0.82	High
4. Creating an original product or performance to express my ideas.	3.69	0.95	High
5. Inventing a solution to a complex, open-ended question or problem.	3.50	0.85	High
Over-all	**3.71**	**0.77**	**High**

Table 2.4 Level of 21st Century Skills in terms of Collaboration

Collaboration	**Mean**	**SD**	**Descriptive Equivalent**
1. Working in pairs or small groups to complete a task together.	4.13	0.88	High
2Grafting with other students to set goals and create a plan for the team.	4.13	0.82	High
3.Creating joint products using contribution from my classmates.	3.87	0.85	High
4 Presenting group work to the class, teachers, or	3.99	0.88	High

others.			
5. Working as a team to incorporate feedback on group task or products.	4.27	0.76	Very High
Over-all	**4.08**	**0.62**	**High**

APPENDIX F

Reliability Test Result

Test of Reliability

Variables	**Cronbach's Alpha**	**Mean Inter-Item Correlations**	**Internal Consistency**	**N**
Game-Based Learning Practices	**0.921**	**0.322**	**Very Good**	**25**
21st Century Skills	**0.909**	**0.335**	**Very Good**	**20**

Prepared by:

PROF. REX L. SARVIDA
Statistician

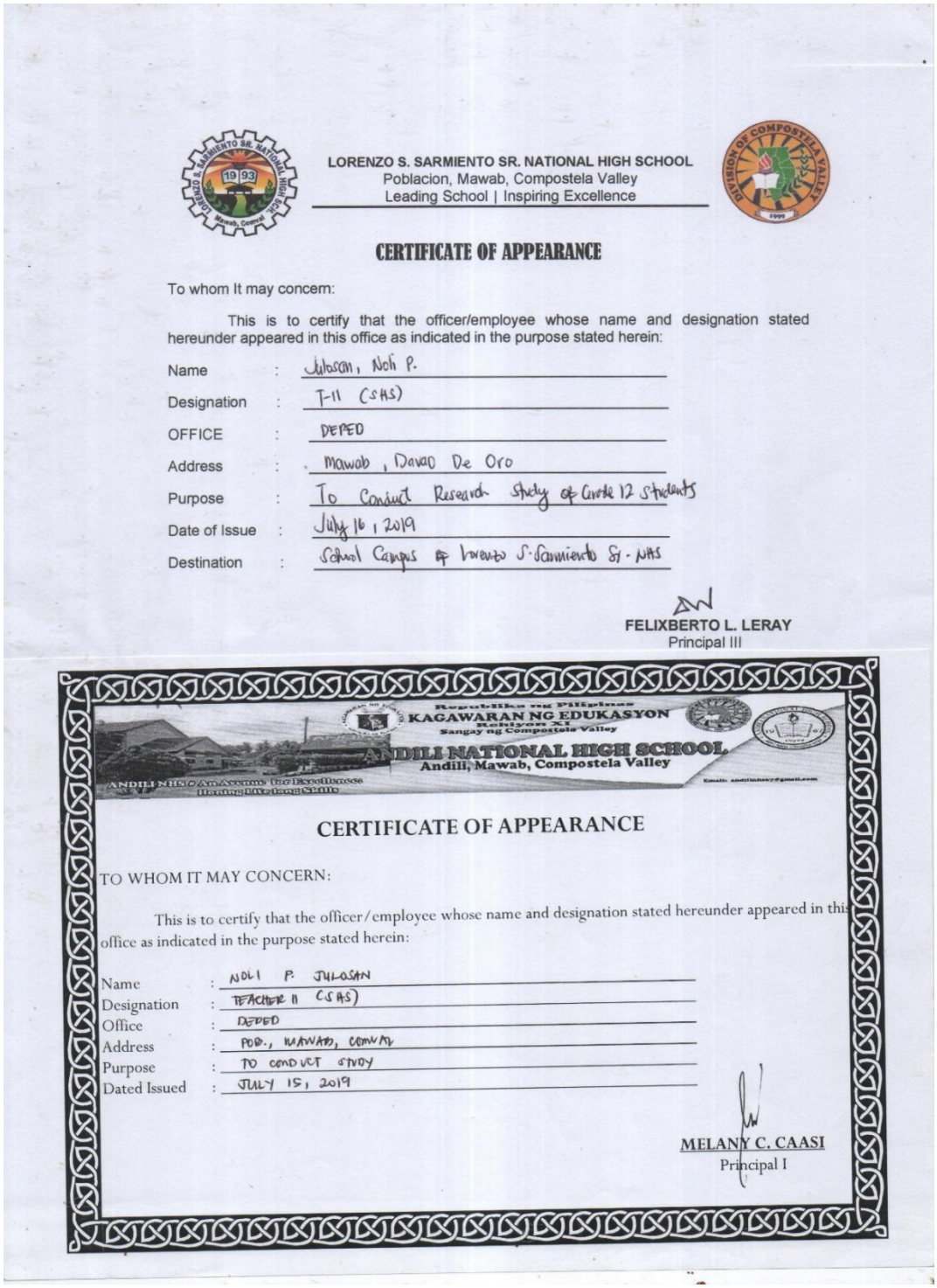
International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

APPENDIX G

Certificate of Appearance



LORENZO S. SARMIENTO SR. NATIONAL HIGH SCHOOL
Poblacion, Mawab, Compostela Valley
Leading School | Inspiring Excellence

CERTIFICATE OF APPEARANCE

To whom It may concern:

This is to certify that the officer/employee whose name and designation stated hereunder appeared in this office as indicated in the purpose stated herein:

Name : Julosan, Noli P.
Designation : T-II (SHS)
OFFICE : DEPED
Address : Mawab, Davao De Oro
Purpose : To Conduct Research Study of Grade 12 Students
Date of Issue : July 16, 2019
Destination : School Campus of Lorenzo S. Sarmiento Sr. NHS

FELIXBERTO L. LERAY
Principal III

Republika ng Pilipinas
KAGAWARAN NG EDUKASYON
Rehiyon XI
Sangay ng Compostela Valley
ANDILI NATIONAL HIGH SCHOOL
Andili, Mawab, Compostela Valley

CERTIFICATE OF APPEARANCE

TO WHOM IT MAY CONCERN:

This is to certify that the officer/employee whose name and designation stated hereunder appeared in this office as indicated in the purpose stated herein:

Name : NOLI P. JULOSAN
Designation : TEACHER II (SHS)
Office : DEPED
Address : POB., MAWAB, COMVAL
Purpose : TO CONDUCT STUDY
Dated Issued : JULY 15, 2019

MELANY C. CAASI
Principal I

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ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

Republika ng Pilipinas
KAGAWARAN NG EDUKASYON
Rehiyon XI
SANGAY NG COMPOSTELA VALLEY
NUEVO ILOCO NATIONAL HIGH SCHOOL
"a gateaway of progress & excellence"
Nuevo Iloco, Mawab, Comval

CERTIFICATE OF APPEARANCE

TO WHOM IT MAY CONCERN:

This is to certify that the officer/employee whose name and designation stated hereunder appeared in this office as indicated in the purpose stated herein:

Name: NOLI P. JULOSAN
Designation: T-II (SHS)
Office: DEPED
Address: POBLACION, MAWAB, COMVAL
Purpose: TO CONDUCT RESEARCH STUDY
Date Issued: JULY 15, 2019

GERARDO N. CAASI
School Principal I

Republic of the Philippines
Department of Education
Tuberan National High School
"Cradle of Community Building and Development"

DepED

CERTIFICATE OF APPEARANCE

TO WHOM IT MAY CONCERN:

This is to certify that the officer/employee whose name and designation stated hereunder appeared in this office as indicated in the purpose stated herein:

Name	:	NOLI P. JULOSAN
Designation	:	TEACHER II (SHS)
Office	:	DEPED
Address	:	POB., MAWAB, COMVAL
Purpose	:	TO CONDUCT STUDY
Date of Issue	:	JULY 15, 2019
Destination	:	TUBERAN NATIONAL HIGH SCHOOL

ROGELIO A. GONO
HT III/SIC

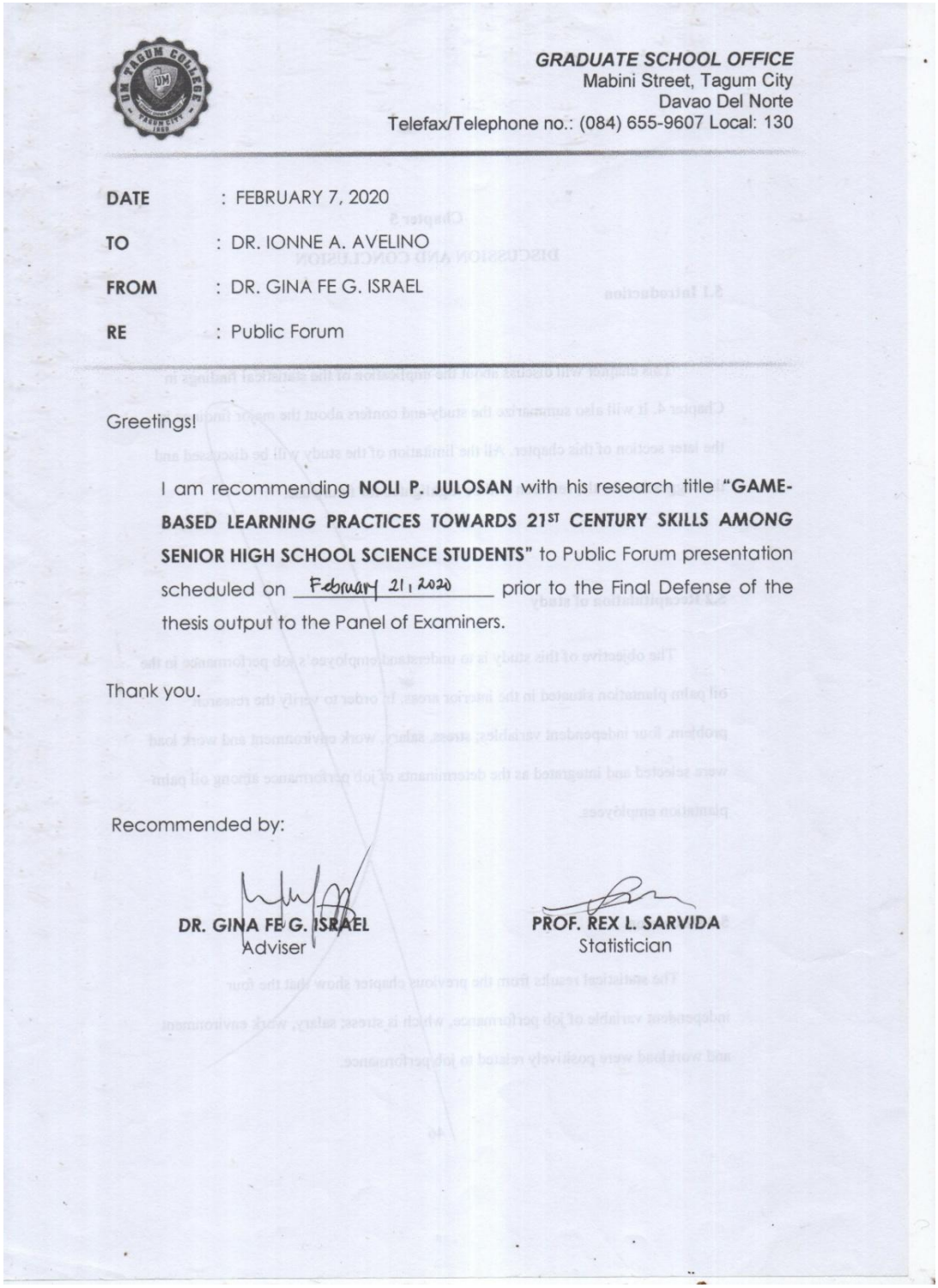
International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

APPENDIX H

Certificate of Public Forum



GRADUATE SCHOOL OFFICE
Mabini Street, Tagum City
Davao Del Norte
Telefax/Telephone no.: (084) 655-9607 Local: 130

DATE : FEBRUARY 7, 2020

TO : DR. IONNE A. AVELINO

FROM : DR. GINA FE G. ISRAEL

RE : Public Forum

Greetings!

I am recommending **NOLI P. JULOSAN** with his research title **"GAME-BASED LEARNING PRACTICES TOWARDS 21ST CENTURY SKILLS AMONG SENIOR HIGH SCHOOL SCIENCE STUDENTS"** to Public Forum presentation scheduled on February 21, 2020 prior to the Final Defense of the thesis output to the Panel of Examiners.

Thank you.

Recommended by:

DR. GINA FE G. ISRAEL
Adviser

PROF. REX L. SARVIDA
Statistician

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ISSN 2581-5148

Vol. 8, Issue.1, Jan-Feb 2025, p no. 228-307

APPENDIX I

Turnitin (Plagiarism Checker) Certification

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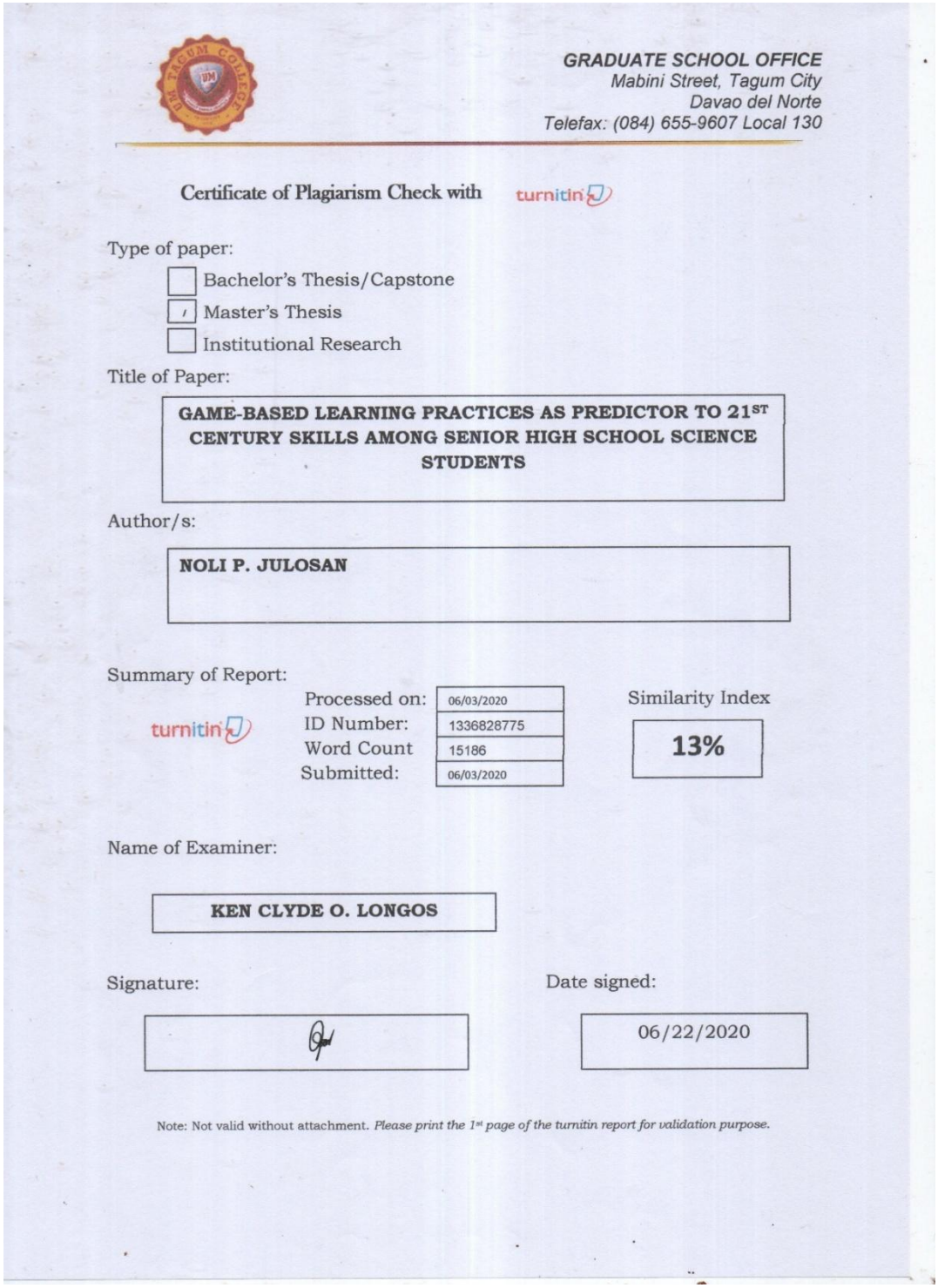

GRADUATE SCHOOL OFFICE
Mabini Street, Tagum City
Davao del Norte
Telefax: (084) 655-9607 Local 130

Certificate of Plagiarism Check with turnitin

Type of paper:

- [ ] Bachelor's Thesis/Capstone
- [/] Master's Thesis
- [ ] Institutional Research

Title of Paper:

GAME-BASED LEARNING PRACTICES AS PREDICTOR TO 21ST CENTURY SKILLS AMONG SENIOR HIGH SCHOOL SCIENCE STUDENTS

Author/s:

NOLI P. JULOSAN

Summary of Report:

turnitin

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Submitted:	06/03/2020

Similarity Index: **13%**

Name of Examiner:

KEN CLYDE O. LONGOS

Signature:

Date signed: 06/22/2020

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