

## The Use of Three Ns (Niteni, Niroke, Nambahi) in Developing Practice e-Guidebooks

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### Abstract

Successful learning processes rest on the learning climate and support for learning media and the educators' competence to mix interesting materials and appropriate teaching methods. The focus of this research is on the development of a threeNs (Niteni, Niroke, Nambahi) embedded in the practice e-guidebook to enhance conceptual creativity in the Tamansiswa Institution. The objectives of this research are to describe (1) the characteristics of practice e-guidebooks; and (2) the development of the practice guide-eBook design containing pedagogies in connecting links of tables accompanied by symbols that indicate the three Ns (niteni, niroke, nambahi) during the practicum session. This research refers to the Borg & Gall development model consisting of three stages, namely (1) a preliminary study, (2) product design development, and (3) product validation and revision. The data collection techniques include observation and questionnaire. The data analysis technique used quantitative and qualitative descriptive method (a mixing method). The research subjects were students of Science Study Program at Universitas Sarjanawiyata Tamansiswa, Yogyakarta, Indonesia. The data collection instruments are validation sheets of media experts, materials, and student affairs, documentation, observation sheets, and questionnaire sheets in the form of Google forms. The results of this research show (1) the characteristics of the practicum guides in the form of electronic books (e-books) and three Ns (niteni, niroke, nambahi) pedagogies; (2) practicum e-guidebooks containing pedagogies in the form of connected tables accompanied by symbols that indicate the three Ns (niteni, niroke, nambahi) during the practicum.

**Keywords:** e-book; practicum guide; three Ns (niteni, niroke, nambahi)

### Introduction

The development of science and technology has given birth to the Industrial Revolution 4.0 commonly called a disruptive era towards the internet of things (IoT). The world of education must synchronize technologies to uphold the development of the industrial era. All components of the education system processes can produce curriculum concepts, specific educational methods, and educational technologies that increasingly remain competitive by following the development of technological sciences. The industrial era provides four fundamental principles including (a) interconnection (connection), e.g., the ability of machines, devices, sensors and people to connect and

communicate with one another through the Internet of Things (IoT) or the Internet of People (IoP); (b) information transparency defined as the ability of information systems to create virtual copies of the physical world by enriching digital models; (c) technical assistance through the ability of systems that supports people to facilitate problem-solving in a short period of time; and (d) decentralized decisions[1]

Internet can change people's perspectives and ways of life from real to virtual dimensions of life existentially. The Internet of Things (IoT) holds pragmatism that has great potentials to incarnate as a new dimension in the world of communication without distance and time limits. Cybercultures manifested in the rise of social media networks pave the way for explorative and open spaces. This role has replaced the virtual reality of space that transforms social media into a practice of public education and contextual social changes[2]. Furthermore, Susanto asserts that the current influence of media has taken over the social role in developing the world of contemporary society. The media plays a key role to support social media users, social scientists and researchers in the field of communication[3] so that communication can take place anytime and anywhere using a wide variety of media[4]. Therefore, everyone must have critical thinking skills, knowledge and digital literacy abilities, information literacy, and media literacy to master information and communication technology [5]

The Internet of things (IoT) has played more and more roles in all fields. Even in the disruptive era, education puts more emphasis on digital and paperless platforms. Printed learning media are rarely used or drastically minimized because people have shifted to digital media that stay more environmental friendly. The demands for the Internet of things (IoT) prioritize the noble culture preservation of Indonesian people through the fourth dharma in the Tamansiswa Institution, i.e., Ki Hadjar Dewantara's teaching and learning principles are inculcated through three Ns (niteni, niroke, nambahi).

The revolution industry 4.0 is a collective term for technologies and concepts of value-laden organizations. Within a modular structure of the smart revolution industry 4.0, CPS monitors physical processes to create a virtual copy of the physical world that leads to decentralized decisions [1]. As the Internet of Things (IoT) remains decentralized, cyberculture seeks to build communication with each other through the media in real time. Through IoS, internal service systems and cross-organization offer participants a continual form of rhythm to accelerate simulation technologies in various activities, including teaching and learning activities. Today's activities in the contemporary society explore the virtual space in work cycles with high acceleration of simulation technologies [6]

The literature review identified four key components of revolution industry 4.0, namely cyber physical systems, internet of things, internet of services, and smart factories. Machine-to-machine (M2M) communication and smart products are not regarded as independent industry 4.0 components. As the authors have emphasized, M2M is an enabler of the internet of things, and smart products are a subcomponent of cyber-physical systems[7]. Like other authors, Kagermann is interested in pursuing big data and cloud computing as data services that utilize the data to generate the revolution industry 4.0 and its independent implementations.

## Method

This research adopted the Borg's and Gall's development model that includes 5 main steps, namely (1) analyzing the product to be developed, (2) developing the initial product, (3) expert validation and revision, (4) scale field trials minor, and (5) revision of the final product. The instruments were validation sheets and documentation. Validation sheets were used to assess products by using materials, media and student experts. Besides, it is necessary to get input suggestions to improve the products. Documentation is in the form of photographs of e-book development in each process[8].

The research results show the validation in the form of descriptive quantitative data to determine the quality of e-books. Based on this validation, the e-book has been developed and revised according to suggestions and input. The validation sheets refer to the 2014 BSNP. The score on the validation questionnaire is in the form of an assessment based on the Guttman's scale as shown in the following table.

Table 1 Guttman's Scale Score

Assessment	Grade/Score
Yes	1
No	0

(Sugiyono, 2011)

The validation of each criterion deals with conformity to the materials, media, and students' affairs as obtained through a percentage with the following equation:

$$P(\%) = \frac{\text{A total score of the data collection}}{\text{Criterion Score}} \times 100\%$$

Criteria score = highest score x number of aspects x number of respondents interpreting the feasibility score of the e-book as viewed in the table below.

Table 2 Score Interpretation

Presentase	Categories
0% - 20%	Very low
21% - 40%	Low
41% - 60%	Enough
61% - 80%	Good
81% - 100%	Very good

(Riduwan, 2014)

## Results and Discussion

The advancement in science and technology has influenced the civilization in the world, giving rise to the revolution industry 4.0. In this era, there has been a new world order through the occurrence of fast disruptive technology in the fields of industry, work and business and even education along with the following principles worth considering [7].

Integrating the Internet of Things (IoT) and the Internet of Services (IoS) in the manufacturing processes has initiated the revolution industry 4.0 (Kagermann et al., 2013: 5). The IoT allows things and objects, such as RFID, sensors, actuators, mobile phones through unique addressing schemes to interact with each other and cooperate with their neighboring 'smart' components to reach common goals (Giusto, Lera, Morabito, & Atzori, 2010: v). The IoT can be defined as a network in which CPS cooperates with each other through unique addressing schemes. Application examples of the IoT are smart factories (see the explanation below), smart homes, and smart grids (Bauernhansl, 2014: 16-17).

The Internet of Services (IoS) greatly enables the system service vendors to offer their services through internet access on pages consisting of participants, service infrastructure, business models, and services in one network system package. Services are offered and combined into value-added services using various suppliers to communicate with users and consumers through various channels [9]. This development allows a new way of dynamic variation and the distribution of individuals to

the value chain activities (Platform Industry 4.0, 2013: 4). The concept is transferred from the factory to the entire world network to have added value for the future benefit. These production technologies offer the IoS to manufacture products or compensate production capacities (Scheer, 2013: 2). The vehicle bodies know their specific customer configurations and can decide autonomously which working steps are needed. Therefore, they can individually compose the required processes through the IoS and autonomously navigate through the production [10].

The decentralized market demand for individual products finds it increasingly difficult to carry out a centralized control system. Embedded computers enable CPS to make decisions on their own. Only cases of failure tasks are delegated to a higher level [1]. In the context of the smartfactory, the plant decentralization means that the RFID tags "tell" machines which working steps are necessary. Therefore, either central planning or controlling is no longer needed (Schlick et al., 2014, p. 75). The market demand for individual products is difficult to carry out a centralized control system.

In the revolution industry 4.0 era, humans are required to be more critical, creative, and literate in digital terms[5]. The internet has made many changes in the life of the world today because things are getting faster and closer so that long distances no longer hinder various activities and communications[4]. The revolution industry 4.0 demands that the world of education begins to shift towards digital or electronic-based learning including teaching materials used to further minimize the use of papers (a paperless platform).

Runnels and Griffith state that a paperless classroom is of paramount importance. When all materials are required to complete, a class is available to deliver an electronic form as it has positive impacts on students and teachers in terms of motivation, engagement, productivity, and efficiency [11]. Recent trends suggest that all technological tools are available, and PC tablets can support many aspects of a paperless classroom for both students and teachers. Various resources can describe the efforts of developing and implementing learning interactions using a PC tablet that is practical and highly available so that they can choose the right tool to use.

Adaptive e-learning uses an intelligent tutoring process and designs of adaptive media technology by providing basic contents suitable for students' different characteristics, needs, and abilities. Finally, learner-centered approaches require traditional educational practices and adapt them to the available technology, allowing students to interact directly with the technologies in the classroom[12]. E-learning includes technology elements in the classroom so that they can be fully managed with an electronic and paperless presentation system. Paperless classrooms not only have notable cost benefits[13], but also productivity and efficiency for both students and teachers[14] while improving engagement and motivation[15]. The transformation of paper-based learning seeks to incorporate the traditional way into e-learning learning systems. A learning system enhances the material and the technique of presentations, the characteristics and the needs of students intertwined synergistically. The design of the e-guidebook for science practice begins with the analysis of materials in the practicum activities. The initial design of the e-book is used as a practical guide in the form of electronic books. The characteristics of this practical guide can be found in the three Ns principles containing components, symbols, and descriptions of students' practicum activities.

This research specifically reports the development of a three-N-practical e-guidebook (niteni, nirokke, nambahi). The initial product analysis concludes that it is necessary to develop practical instructions in the form of electronic books. This is because the use of practicum manuals in a printed form requires multiplication in large numbers, resulting in more and more paper waste to accumulate. That is why, this tradition contravenes the concept of going green that inspires everyone to embark on paperless lifestyles.

All of these things are stated in every practicum e-guidebook. This electronic book also contains general things in a practicum manual, such as practicum regulations, practicum implementation cards, official report templates, temporary report sheets, bibliography, and book covers. Syamsu points out

that practicum instructions must pay attention to several aspects, such as ease of use, and the time required for short, fast, and precise implementations easily interpreted by practitioners[16]. Students are expected to prepare, design, and accomplish practicum reports. This is because the practicum instructions are used to help the successful implementation of the practices that contain procedures for preparation, rules for implementations, analysis of data, and rules for reporting activities concerning the Decree of the Minister of National Education Number: 36 / D / O / 2001. This is also relevant to Purnamasari's statement in that practicum instructions connect to the learning process by using practicum methods[17].

The practicum instructions are prepared to guide students in carrying out practical activities to achieve the desired learning goals. At the product planning stage, it is important to develop a needs analysis and observation questionnaires. The analysis of practicum guidance requirements are shown in the following figure[18].

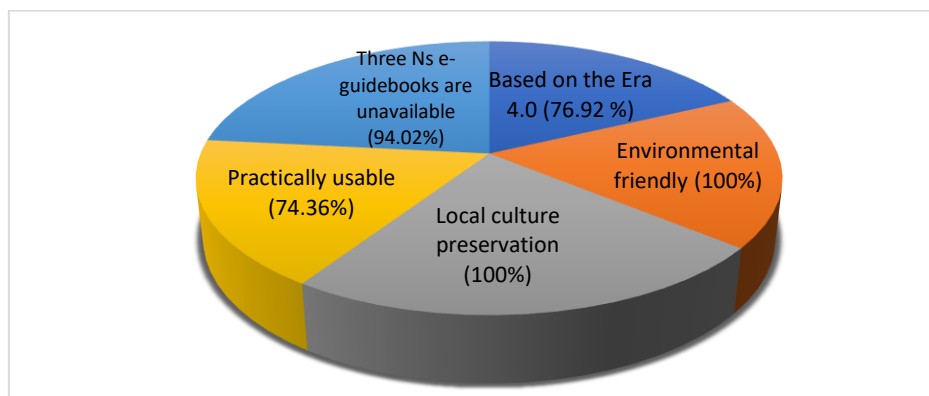


Figure 1. A needs analysis graph

Berdasarkan grafik analisis kebutuhan diketahui bahwa mahasiswa menginginkan dikembangkan e-book panduan praktikum karena sesuai era R.I 4.0 (76,92 %) dan lebih praktis penggunaannya karena dapat diakses dimanapun dan tidak memakan tempat serta tidak perlu mengingat waktu kapan harus dibawa (74,36%) serta ramah lingkungan (100%). Panduan praktikum yang dibutuhkan selain sesuai era disruptif, paperless, dan praktis juga harus tetap mengedepankan pelestarian kearifan budaya lokal (100%) salah satunya dengan berbasis ajaran Ki Hadjar Dewantara Tri-N (94,02%). Berdasarkan hasil analisis kebutuhan dapat disimpulkan bahwa dibutuhkan panduan praktikum dalam bentuk e-book dan berbasis ajaran Tri-N.

Tahapan berikutnya adalah tahap design e-book panduan praktikum berbasis Tri-N. Hasil yang diperoleh pada tahapan ini adalah tersusunnya panduan praktikum dalam bentuk buku elektronik yang dapat diakses online oleh siapapun sehingga tidak memerlukan penggandaan untuk dibagikan ke mahasiswa. Karakteristik lain dari panduan praktikum ini selain berbentuk e-book juga berbasis salah satu ajaran Ki Hadjar Dewantara, yaitu Tri-N (niteni, nirokke, nambahi). Ajaran Tri-N dimasukkan dalam bentuk tabel hubung kait disertai simbol dan penjelasan dalam setiap tahapan kegiatan praktikum dengan ajakan untuk melakukan setiap tahapan dalam ajaran niteni, nirokke dan nambahi [18].

Produk yang dihasilkan kemudian di validasi oleh 3 orang ahli, yakni ahli materi, ahli media, dan ahli ketamansiswaan. Selain divalidasi oleh ahli, e-book juga diujicoba terbatas kepada mahasiswa untuk mendapat keterbacaan produk. Instrumen keterbacaan produk dilakukan oleh mahasiswa menggunakan google form. Hasil dari semua penilaian ini dapat disimpulkan bahwa e-book layak untuk digunakan. Kegiatan selanjutnya adalah merevisi e-book sesuai hasil penilaian dari para ahli. Hasil penilaian dari aspek materi dengan prosentase sebesar 75% menunjukkan hasil baik dalam

artian e-book layak digunakan. Penilaian dari aspek media sebesar 94% dan 100% untuk aspek ketamansiswaan menunjukkan hasil bahwa produk sangat layak untuk digunakan. Hasil penilaian kelayakan e-book ditunjukkan oleh gambar 2.

Figure 1 shows that students want to develop a practical e-guidebook because it is closely related to the revolution industry 4.0 (76.92%) and is more practical to use because it can be accessed anywhere, and portable without considering any specific places (74.36%) and environmentalfriendly (100%). Besides, the practicum guidance used in the desruptive, paperless, and practical era prioritizes the preservation of local culture wisdom (100%), one of which is based on the teachings of Ki Hadjar Dewantara called three Ns (94.02%). Thus, there is a need for practicum guidance in the form of e-books and three Ns teachings.

The next stage is the design phase of the three Ns practicum e-guidebook. The results at this stage include the preparation of practicum guides of accessible e-books for the general public so that they are distributed to students without duplications. Besides, they are based on Ki Hadjar Dewantara's teachings, namely three Ns (niteni, niroke, nambahi). The three Ns teachings have a linkage table accompanied by symbols and explanations at each stage of practicum activities [18].

The product is then validated by three experts, namely material experts, media experts, and student experts. In addition to being validated by experts, e-books are also limited to students' testing to get the product readability. The product readability instrument is conducted by students using Google forms. The results of all of these assessments imply that the e-book is suitable for use. The next activity is to revise the e-book according to the results of the assessment of the experts. The results of the assessment show the material aspect (75%) that indicates good results in terms of e-books worth using. Evaluation from the media aspect (94%) and the ketamansiswaan aspect (100%) that shows the product suitable for students to use. The results of the e-book's feasibility assessment are shown in the figure below.

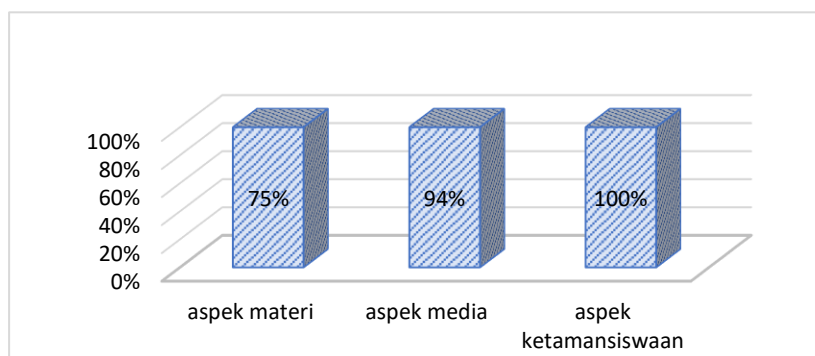


Figure 2. The eligible validity assessment of e-booksthat can be accessible online at <http://ani-widyawati.blogspot.com/>

A theoretical basis in a literature review can be learned through references concerning practical and experimental activities. It is necessary to present theories concisely, clearly, accurately, comprehensively and easily in conducting practicum activities. Students are required to understand the purpose of practical activities that need (1) tools and materials so that students are prepared to do the activities successfully and smoothly. (2) This component contains a detailed explanation of the steps taken in carrying out practical activities. The activities are written in bullet points to help students understand the materials well. (3) Observation results are arranged in the form of observation results tables during the practicum activities. These observations need further analyses and conclusions in the discussion section. (3) The discussion section contains questions concerning

practicum activities. The answers to the questions are discussed, and written in an official report. Every question is intended to test and determine the level of students' understandings of the practice materials.

At this level of absorbing tools and materials, ways of working need the appropriate three Ns teaching principles. This is because practicum activities involve observations with the five senses starting from preparing tools and materials to the working steps. All the three Ns pedagogical principles are integrally implemented to help students understand, imitate and modify knowledge written both in motion using tools and materials and procedures in terms of the e-bookson practical instructions. In this sense, students do academic activities to obtain the desired results, imitating experimentally and sensing the working steps, and imitating practical instructions. Likewise, Rahayu emphasizes that *niteni* means listening, observing, and paying attention while *niroke* is an imitation activity that has been determined in the observation [19]. Susanto examines that education processes foster the social sensitivity and independence to actualize the three Ns (*Ngerti*, *Ngroso*, and *Ngelakoni*) concepts. A teacher has guidelines for initiating the applicable systems for students to observe everything carefully and remember it specifically (*Niteni*), imitate or adapt to something (*Nirokake*) that has been observed in detail, and modify it based on the encouragement to create and innovate (*nambahi*) things freely. A student can participate in many learning activities and make decisions to understand a leadership policy. The processes of understanding, imitating, feeling, and implementing things are followed by what he or she knows, understands, imitates, and feels [2].

The results of observing practicum activities are drawn in a prepared table. Recording observations requires the ability to imitate (*niroke*) and modify (*nambahi*). The ability to write observations is related to recording observations in the appropriate table based on the practical e-guidebooks. Recording these results requires the ability to add, namely analyzing and creating observations that cannot be recorded directly in a tabular form, but needs further thoughts to explore them. The results of this observation will be connected to the discussion section that will require several creative processes, developing ideas and theories to complete the explanation of the practicum results. It is also possible to improvise a high-level analysis especially when the results are not expected. The process of creating and developing ideas does not stop here but continues until the discussion section. Students must answer the questions on the results of the practices and understandings of the materials in theories. Therefore, in the conclusions and answering questions stages, the ability to create, analyze and develop broader thoughts is required. This is what shows the process of modifying to the last stage.

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## Conclusion

The development of e-books as practicum guides has special characteristics focusing on the appearance of the electronic books and their contents concerning the three Ns teachings (*niteni*, *niroke*, *nambahi*). The presentation of the practicum e-guidebook is mainly concerned with a link table accompanied by symbols that indicate the concepts of *niteni*, *niroke*, *nambahi* during the practicum session. This practicum guide is intended not only to provide guidance but also develop creativity so that students can enhance both freedom and creation based on the teachings of three Ns (*niteni*, *niroke*, *nambahi*).

The research results show that the design of a science practicum guide has three Ns (*niteni*, *niroke*, *nambahi*) teaching principles along with the characteristics such as (a) the e-books; (b) the contents and concepts of sciences; (c) the concepts of the three Ns teachings designed for practicum activities in a link table using symbols; (d) the appropriate three Ns activities that have each stage of practicum activities; and (e) the guides of the three Ns (*niteni*, *niroke*, *nambahi*) during the practicum session.

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